Products finishing

A. E. S. Convention Issue

CLEANING
PLATING
POLISHING
FINISHING

JUNE 1950

Announcing

UDYLITE *and* STEVENS CONSOLIDATION

65-Year-Old Company Becomes Subsidiary of The Udylite Corporation

The Udylite Corporation has acquired the entire capital stock of Frederic B. Stevens, Inc., and its wholly owned subsidiaries—the Mitchell Engineering Company of Springfield, Ohio, and Frederic B. Stevens of Canada, Ltd., a Dominion Corporation.

The merging of these two old firms—each a leader in its chosen field—will add to Udylite's famed plating products and solutions, the Stevens machinery, machine tools, equipment and compositions for plating, buffing and polishing, foundry supplies, face brick and glazed tile.

For a quarter century, The Udylite Corporation has pioneered techniques, equipment and processes for *a better way* in plating and finishing. The Stevens background, personnel and products round out a Udylite service to the durable goods industries that ranges from conversion of raw metal in the foundry to highly polished surfaces of finished, utilitarian units.

Stevens factories and warehouses in Buffalo, New York; New Haven, Conn.; Springfield, Ohio; Windsor, Ontario, and two plants and a laboratory in Detroit—as well as the Stevens sales staffs in Cleveland, New Haven, Indianapolis, Buffalo and Windsor, will offer Udylite customers additional service points.

The scientifically trained and integrated Udylite-Stevens technical sales staff will bring to American industry a new conception of "Metal Magic."

The Udylite Corporation, Detroit 11, Michigan

ALL through the summer—through hot, humid days and hot, humid nights—the biggest thief in America will be raiding your plant, stealing your profits, stealing your steel.

In every department—where raw steel comes in, where it is stamped or milled or machined or ground, where it is pickled or cleaned or assembled—the moisture in the air is always helping that big thief, RUST, to rob you of production.

But you don't have to put up with this moist-month thievery. The Oakite Technical Service Representative can help you defeat RUST. He is well equipped with methods and materials for:

1. **Removing rust from raw stock**
2. **Preventing rust while parts are being processed**
3. **Cleaning and de-rusting in one operation**
4. **Cleaning with simultaneous conditioning for painting *plus* protection against rust before and after the steel is painted.**

FREE For help in arresting RUST in your plant, write to Oakite Products, Inc., 20 Thames St., New York 6, N.Y.

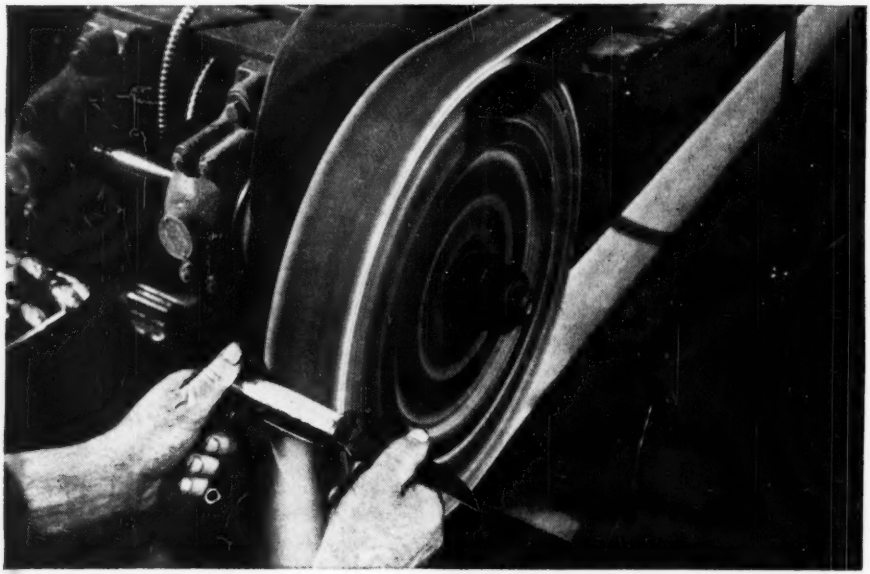
Machine cleaning	**Tank cleaning**	**Electrocleaning**
Pre-paint treatment	**Pickling**	**Barrel cleaning**
Steam-gun cleaning	**Burnishing**	**Paint stripping**

Technical Service Representatives in Principal Cities of U. S. & Canada

OAKITE SPECIALIZED INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

TRADE MARK REG. U. S. PAT. OFF.

CUTTING COSTS ON KNIFE FINISHING



RESINALL® METALITE® CLOTH BELT

finishes 6 different materials in one operation

The steel, brass, plastic, fibre, leather and aluminum in this hunting knife are all the same to the RESINALL METALITE Cloth Belt. Running over the proper Contact Wheel, it removes the stock, shapes the contour and does the final finishing job—a typical example of RESINALL METALITE versatility.

Whatever your material, there is a BEHR-MANNING coated abrasive belt to finish it quickly —profitably. Mail the coupon for our new illustrated Belt Finishing Brochure.

BEHR-MANNING
TROY, N.Y.
Use NORTON® *abrasives* sharpening stones

BEHR-MANNING, Troy, N. Y.
Dept. PF-650
Please send me your Belt Finishing Brochure.
Name .....
Company .....
Street .....
City ..... Zone ..... State .....

Single Responsibility

... by concentrating your orders with a single source of supply, you eliminate many hours of costly paper work. You pay one bill ... have only one supplier who is responsible for your satisfaction ... you get your order when and how you want it ... eliminate days and maybe weeks of waiting. Whether you want an automatic conveyor or a pair of rubber gloves, H-VW-M can shoulder the whole responsibility for the entire order.

Service

... H-VW-M technical assistance is provided by a highly trained staff of chemical, electrical and mechanical engineers backed by the finest laboratory facilities in the industry. H-VW-M Service does not end with delivery of your order ... it is always on tap anytime and anywhere. H-VW-M products are strategically warehoused for prompt delivery ... and because inventories are large all orders get immediate attention.

Dependability

... it's your right to expect and get full dependability from your supplier. Only then can you operate with maximum efficiency and economy ... be sure your product has the extra salability that comes from consistent uniformity and quality of manufacture. Pioneer in developing equipment and supplies for the plating and polishing industry, H-VW-M has honestly earned a highly regarded reputation for complete dependability under all circumstances.

Fair Prices

... you have a right to expect to get exactly what you pay for ... to receive equipment and supplies that accurately measure up to specifications and represent full value of your investment. H-VW-M equipment and supplies are priced to meet changing market conditions ... and H-VW-M *always* delivers full value. What's equally important, is the fact that because H-VW-M serves as the central source of supply for ALL the needs of the electroplating and polishing industry, you can always be sure that price levels will be equably maintained.

Uniform Quality

... means that you get full value for your investment. It means that you are doing a better job ... are helping your company operate at higher profit levels. The reputation for uniformly high quality H-VW-M has earned is one that has been built up honestly over many years. It is your right to expect it. Through strict control of every manufacturing process H-VW-M works ceaselessly to see that you get uniform quality.

HANSON-VAN WINKLE-MUNNING COMPANY, Matawan, N. J.

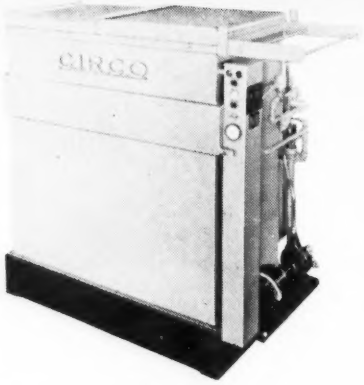
Plants at Matawan, N. J. • Anderson, Indiana • *Sales Offices:* Anderson Chicago • Cleveland • Dayton • Detroit • Grand Rapids • Matawan Milwaukee • New Haven • New York • Philadelphia • Pittsburgh Rochester • Springfield (Mass.) • Stratford (Conn.) • Utica

SINCE 1920

H-VW-M

Manufacturers of a complete line of electroplating and polishing equipment and supplies

Can You Afford Outmoded Metal Parts Cleaning?



A CIRCO engineered degreaser gives you

1. Thorough and speedy parts cleaning
2. Safe operation—uses a nonflammable, non-explosive solvent
3. Economy of operation
4. Long life with stainless clad, nickel clad or zinc sprayed construction.

Before and after nearly every production operation in the metal working industry, a cleaning operation must be performed. Are you risking high production costs with outmoded cleaning methods?

Circo vapor-spray degreasers eliminate costly, hand-labor operations. *Savings of over 90% in time alone are common.* Not only is valuable time saved but better cleaning is assured. Warm vapor, harmless to all metals, thoroughly penetrates every crack or seam. All traces of dirt, oil and grease are absolutely removed, leaving each part ready for immediate inspection. Depending on size, parts can be removed, *absolutely clean and dry,* in 1 to 15 minutes. Best of all, Circo's fully automatic control system guarantees operating economy.

CIRCO DEGREASERS PAY FOR THEMSELVES

For detailed information send for our catalog covering our standard degreasers. Our engineers will gladly work with you on metal cleaning problems requiring equipment of special design. A-3050

CIRCO PRODUCTS COMPANY
Metal Cleaning Equipment
6531 EUCLID AVE. • CLEVELAND, OHIO

PIONEERS IN THE DEVELOPMENT OF HOT VAPOR CLEANING EQUIPMENT

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Office Equipment
LOOKS BETTER . . . LASTS LONGER
. . . when you use PITTSBURGH INDUSTRIAL FINISHES!

Tailor-made coatings of all kinds to meet your performance standards

TODAY, as for more than 90 years, Pittsburgh is giving valuable assistance to many users of industrial paints in solving finishing problems.

For instance, Pittsburgh helps to make better-looking and longer-lasting office equipment and appliances — typewriters, sound-recording and business machines, filing cabinets, water coolers, desks, chairs, desk lamps and metal receptacles of many kinds.

By working with the technical and engineering staffs of the makers of these products, Pittsburgh has produced high-grade industrial finishes to meet a variety of performance standards. Among these are a wide range of Lacquers for metal and wood, an equally wide variety of Industrial Enamels to meet almost every general finishing requirement, and a series of Lavax Wrinkle Finishes for wood, paper, steel, metal castings, aluminum, plastics etc.

These coatings provide exceptional adhesion, toughness and durability. Because they are easy to apply and dry quickly they speed up production. These finishes add to eye appeal and also keep the equipment on which they are used looking better for a longer period.

This broad experience with finishing problems can be helpful to you. Call on us for facts and figures.

PITTSBURGH PLATE GLASS COMPANY
Industrial Paint Division, Pittsburgh, Pa.
Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Paint & Varnish Co., Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio.

PITTSBURGH *Industrial* FINISHES

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

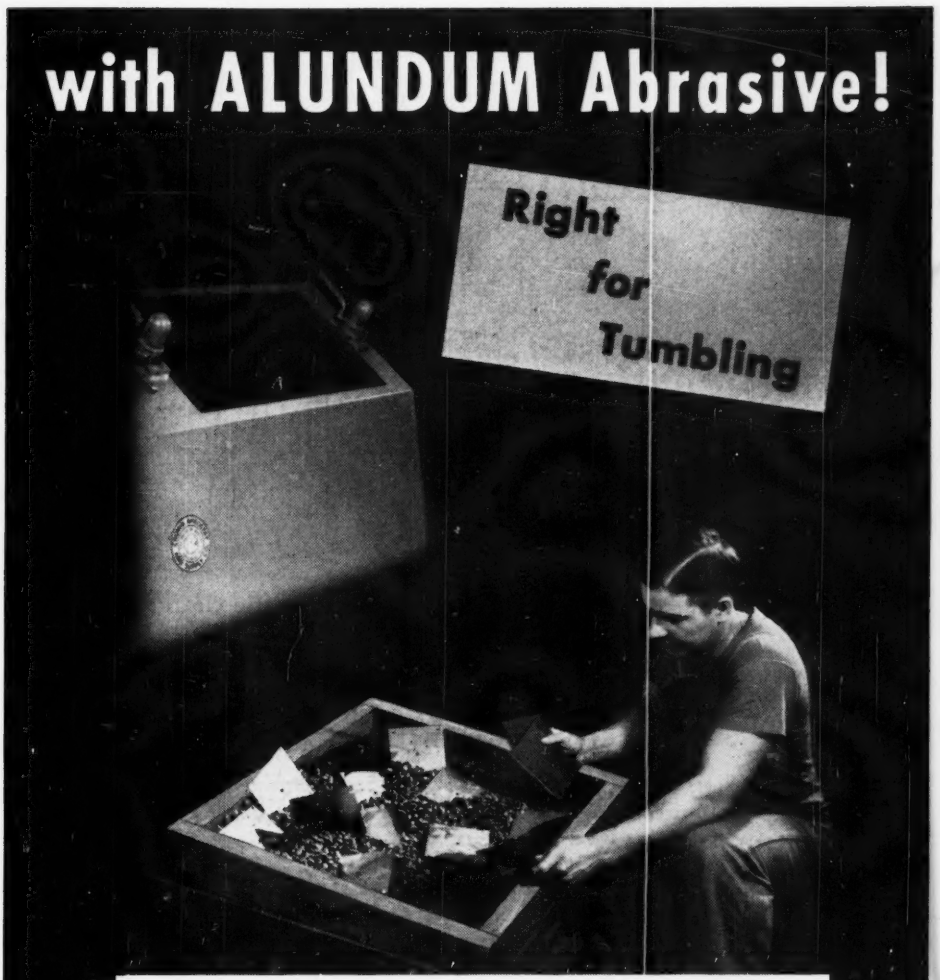
PITTSBURGH PLATE GLASS COMPANY

Reduce Finishing Costs

ALUNDUM Polishing Abrasive is available in a wide range of sizes and with special surface treatments to meet the exact requirements of every polishing job. For helpful polishing tips and for full details on cost-cutting ALUNDUM abrasive see your Norton distributor—or write for a free copy of "Setting-up Metal Polishing Wheels and Belts."

NORTON COMPANY, WORCESTER 6, MASS.
Distributors in All Principal Cities
Consult Your Classified Telephone Directory

with ALUNDUM Abrasive!



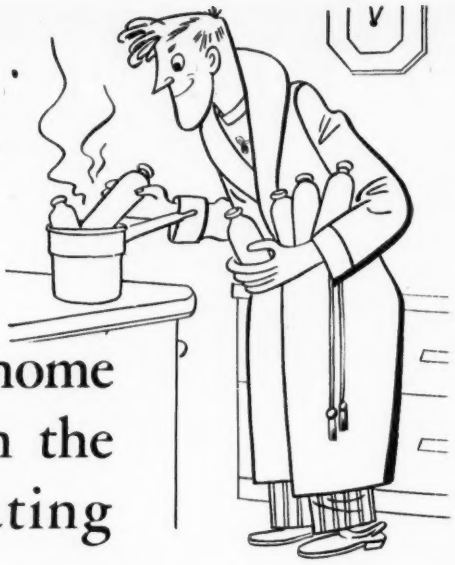
ALUNDUM Tumbling Abrasive is an ideal tumbling medium because—it's ***all abrasive*** for a continuous cutting action—it's ***heavy*** for a fast, positive cut—it's ***hard and tough*** for a long productive life. For further details contact your Norton distributor or write direct to our Sales Engineering Department.

NORTON ABRASIVES

G-211

Start Clean...

Stay Clean!



Whether it's at home with baby or in the plant with plating

You'll go to any lengths to keep the bottle clean for baby's formula.

--- and you shouldn't waste the time, labor and expense of cleaning work for plating by putting that work into a plating bath of questionable purity.

Start clean . . . *stay* clean! Use Darco regularly! Darco adsorbs impurities to its surfaces before they can be deposited on the freshly cleaned surface of your work.

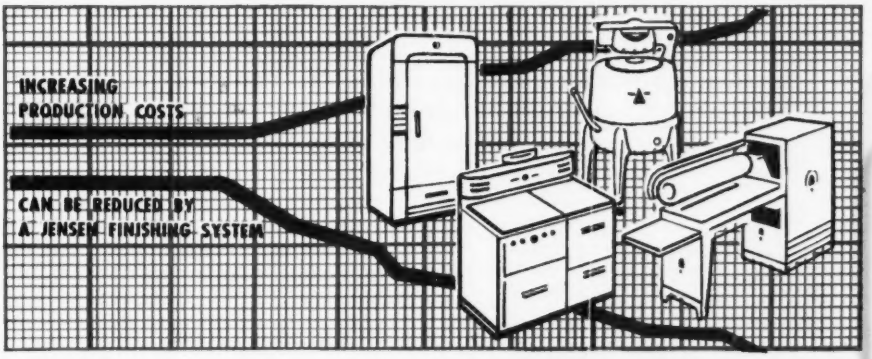
Is your plating bath as clean as the water in your final rinse?

Darco Red Label S-51 is especially easy to handle . . . to wet . . . to incorporate into a slurry. It's especially treated for use in plating --- *the only carbon that will meet the benzol-mercury test!* Place an order for Red Label Darco S-51 today. Practically all leading suppliers carry Darco --- *don't accept substitutes!*

DARCO CORPORATION

60 East 42nd Street, New York 17, N. Y.

TODAY'S COMPETITION DEMANDS THAT YOU REVIEW YOUR FINISHING COSTS



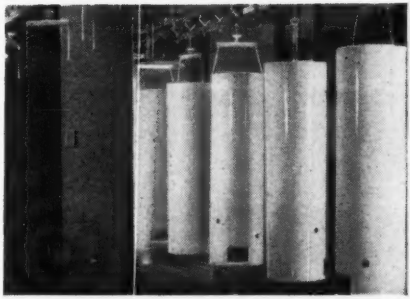
YOU MAY FIND THE WAY TO LOWER PRODUCT PRICES WITH A JENSEN FINISHING SYSTEM

Today, cost-conscious manufacturers whose operations involve low temperature baking, drying, preheating or dehydrating, are cashing-in on the money-saving advantages of infra red radiant heating *plus* coordinated conveying to be found in Jensen Finishing Systems.

Jensen Finishing Systems are *engineered for economy*—designed to increase production and minimize rejects; produce a uniform, finer, tougher finish, using less man hours, less floor space.

ABSOLUTELY WITHOUT COST OR ANY OBLIGATION TO YOU

Let us conduct laboratory tests on *your* products, using *your* finishes. Parts will be promptly returned for your inspection, together with recommendations to meet your production requirements. *You get practical proof of every possible cost saving.*



● Once considered impossible to accomplish with infra red, this Jensen "Dual Heat" *nested-lamp* oven dependably bakes a uniform white and ivory enamel finish on water heater jackets—delivers faster, better results, *plus* over-all economies. *Have you an "impossible" job that needs doing? Let's discuss it.*

Jensen SPECIALTIES INCORPORATED

● Representatives in Principal Cities

9331 FREELAND AVENUE • DETROIT 28, MICHIGAN

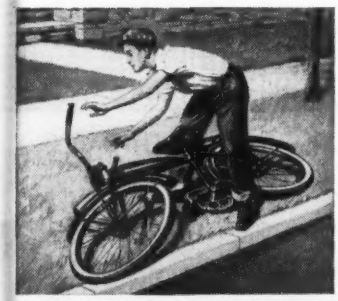
MANUFACTURERS OF *ECONOMY-ENGINEERED* RADIANT HEAT EQUIPMENT

"DUAL HEAT" INFRA RED OVENS • CONVEYORS • PAINT DIP TANKS

The day drudgery went out of style!

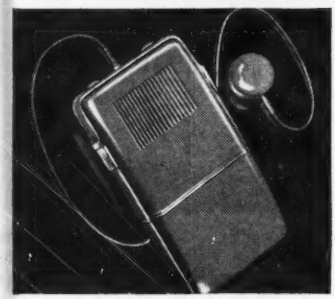
Problem: Housewives hated the drudgery and scrubbing needed to keep their home laundry clean. Manufacturers wanted easy-to-clean finish.

Solution: Industrial Finish Engineers put this drudgery out of style by developing a special finish for automatic laundry equipment and other appliances that can be cleaned quickly with damp cloth. This finish cuts down application and drying time. A cost-saver.



Problem: To find ways to decrease the unit cost of bicycles.

Solution: Industrial Finish Engineers developed a special finish that permits shorter baking time, cutting down production costs. This high-gloss finish has a permanently hard finish that is mar-resistant.



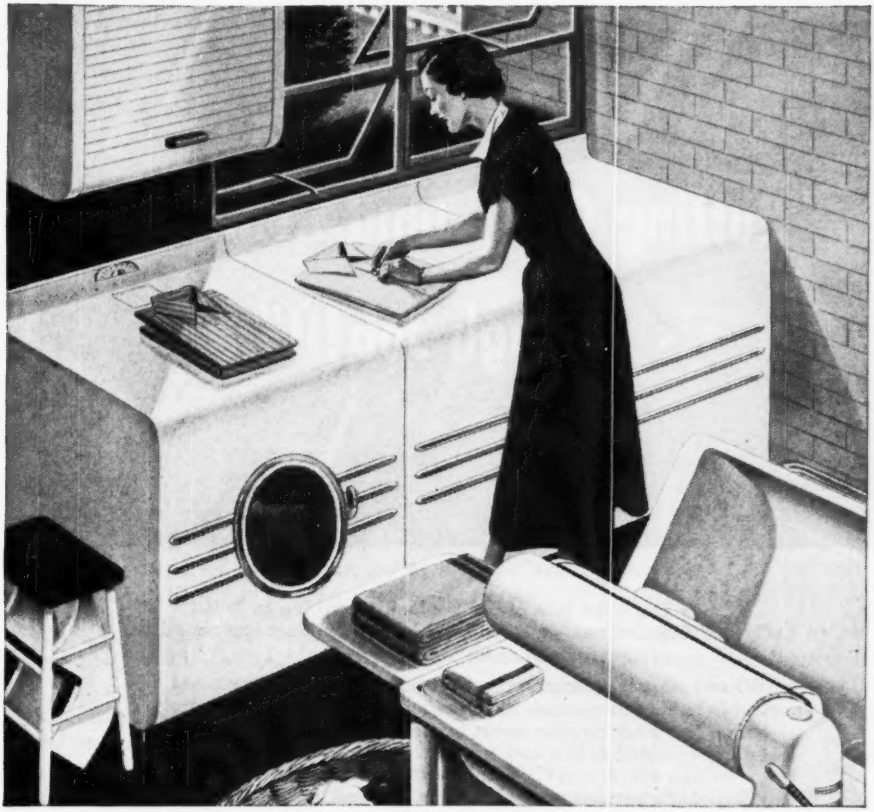
Problem: How to cut cost of wiring electronic devices.

Solution: Industrial Finish Engineers developed special metallic finish which is good conductor of electricity. This eliminates painstaking method of laying wires—saves production time—cuts costs.

Problem: To find an inexpensive way to give overshoes a gleaming surface.

Solution: Industrial Finish Engineers developed a special elastic, durable finish. This finish is baked on in the same operation that cures the rubber. Saves time. Saves money.

The better the



Save time—cut costs through Industrial Finish Engineering!

Cut your manufacturing costs! Lower your break-even point!

Industrial Finish Engineering has done this for many manufacturers. Learn what it can do for you. See an Industrial Finish Engineer.

For the Finish Industry has technical ability to make finishes to suit the specific requirements that you need for your products. Remember, most of your customers *start buying with the finish in mind!*

finish—The better the buy!

© 1950, National Paint, Varnish and Lacquer Association, Inc., Washington, D. C.

"Buffing Compound Removal ~~is~~ was a Tough Job!!!"

● That's the title of the booklet describing in detail Cowles SO Cleaner—the remarkable new buffing compound remover *which really works.*

SO will effectively loosen the most stubborn, heavy, impacted, ground-in buffing compounds for subsequent removal in the electrolytic tanks. The latest developments in metal cleaning research have been incorporated in this new product. Its superior penetrating and wetting action quickly loosens dirt and impacted buffing compounds from *any metal.* SO can be used in still tank, fully and semi-automatic machines and is compatible with a wide range of temperatures. Because SO produces stable emulsions at low concentrations, it assures thorough rinsing.

COWLES CHEMICAL COMPANY
METAL CLEANER DEPARTMENT
7016 Euclid Avenue · Cleveland 3, Ohio

The Booklet gives you complete information—send for it today. The coupon is for your convenience.

COWLES CHEMICAL COMPANY
7016 Euclid Avenue
Cleveland 3, Ohio

Please send me your folder "Buffing Compound Removal ~~is~~ was a Tough Job!!!"

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

Pf editorial

Vol. 14, No. 9

JUNE, 1950

Scientists and Electroplaters

There has been a radical, progressive change from the ancient alchemist, who conducted his (to us) crude and queer experiments in an atmosphere of deep, dark mystery and secrecy, to the scientist of today who has helped to make such tremendous advances in scientific knowledge by basing his experiments on previous investigations, as well as sound theory, and by publishing his results for the guidance of contemporary and future scientists.

Likewise, the electroplater of today, unlike his predecessors, seeks to extend his knowledge and share his findings with his fellows, realizing that in that way only can he make progress. As a matter of fact, the remarkable progress of the industry is due, in no small measure, to a few electroplaters who sought to disseminate plating information and, to accomplish the purpose, founded the American Electroplaters' Society. These founder members will be paid a well earned tribute at the 37th Annual A.E.S. Convention this month.

Another sidelight on the degree of transition of electroplating from an ancient art to a science is furnished by an inspection of some of the "tools" used by the modern electroplater. Some of these tools are described in this issue in the article beginning on Page 64. The comment may well be made that some of the devices appear to be scientific instruments rather than "tools" of the electroplater. By the same token, in the electroplating industry the line of demarkation between scientists and electroplaters is becoming increasingly indefinite. A visitor to the A.E.S. Annual Convention will find both groups in attendance.

The scientific and technical advancement made in the electroplating industry by scientific electroplaters and electroplating-minded scientists has been a leading factor in the growth of that industry in net worth and dollar volume (by improvement of the quality and acceptance of its products), and has laid a firm foundation for future progress.

Ezra A. Blount

A·E·S 37th ANNUAL CONVENTION

4th INTERNATIONAL CONFERENCE ON ELECTRODEPOSITION

BOSTON • MASSACHUSETTS • JUNE

STATLER HOTEL
CONVENTION HEADQUARTERS

• BOSTON

12-15 • 1950

AERIAL VIEW
OF BOSTON

Welcome to Boston

Manson Glover
General Chairman

THIS year the Boston Branch acts as sponsor not only for the 37th Annual Convention of the American Electroplaters' Society but also for the 4th International Conference on Electrodeposition. Members of the Electrodepositors' Technical Society, the National Association of Electrotypers and Stereotypers, and the National Association of Metal Finishers will also participate in the program.

The Boston Convention Committee cordially invites all A.E.S. members and guests to attend the Convention. A personal invitation from Manson Glover, general chairman of the Boston Convention Committee, outlining some of the features of the social program, follows:

"Friends of the A.E.S.:

"On the following pages you can see an outline of the Educational Program for the Boston Convention. You may have some little interest also in the solemn rites that will go on outside the educational sessions.

"The fundamental program items will not, of course, be missing. The Fellowship Open House on Monday evening, the fluent hospitality of our supplier hosts through the whole convention, and the Annual Banquet which will wind up the whole on Thursday evening are the good old staples in which we can only hope to live up to the high standards of our predecessors. We'll do our best—and it may be a pretty good best. Joe Duffy has lined up Tedesco, a championship course in the rolling hills of the near North Shore, for the golf tournament: he says it will be a good tournament with a break for everybody and that whoever forgets his clubs and shoes will bitterly regret the oversight. Dave Clarin will MC for Aunt Ella at lunch in his usual suave manner, and Plato will entertain at the Thomson Club in connection with the Wednesday outing.

"The Outing will be held at Nahant, which is a huge pile of rocks at the end of a couple of miles of sandy beach. It overlooks Boston Harbor. Swimming is fine for polar bears only, but paddling is available and our virile athletes will contest softball and horseshoe championships to the cheers and razzberries of the unambitious. At the end of the afternoon, when the golfers have returned from nearby Tedesco, the celebrated Kendall will pull the steaming seaweed off the clambake pit and clams, lobsters, and general fixings will be at your disposal. Generous bibs will be passed around, but just the same wear your old clothes: this is the kind of meal that splashes.

"For Tuesday evening we have Electroplaters' Night at the Boston Pops. The Convention has the whole floor of Symphony Hall, where light refreshments can be had at the little tables while Arthur Fiedler and the world's best orchestra play for us the gay and lively music that everybody likes. Boston at its best.

NATIONAL OFFICERS
AMERICAN ELECTROPLATERS' SOCIETY

S. S. Johnston
Past President

Arthur W. Logozzo
President

William J. Neill
First Vice President

"Our Ladies' Committee, sensing that the mysteries of plating have too long been reserved to a single sex, have arranged a technical session where the girls will be brought up level with the ignorance of their men-folks. On Monday a sight-seeing tour will show off the historical and educational high spots of the city, and for Tuesday there is arranged a tea and conducted tour at Mrs. Jack Gardners' Museum, an Italian palace of Renaissance times transplanted bodily into the lovely Fenway.

"The Convention Committee wishes here to make special acknowledgment of indebtedness to the suppliers of the Society. In a very real sense, they will be your hosts.

"June is a lovely month in New England. Boston is a swell place to enjoy life. And the early rush of reservations suggests that Everybody You Ever Knew will be at the Statler on June 12 to help you take advantage of both facts."

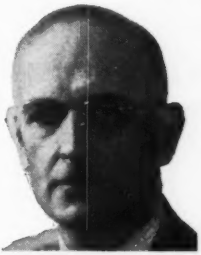
BOSTON CONVENTION COMMITTEE
Manson Glover, General Chairman

C. F. Nixon
Second Vice President

F. J. MacStoker
Third Vice President

CONVENTION COMMITTEE CHAIRMEN

Ladies' Committee—Anne Baker Love.
Program—Stanley S. Knight.
Educational—Leonard A. Chesworth.
Branch Exhibits—Harold Narcus.
Registration—James H. Anderson.
Entertainment—Edmund S. Jevely.
Banquet—Kenneth R. Corson.
Outing—Joseph T. Sullivan.
Hotel—Rudolph L. Helgeson.
Hotel Reservations—Walter L. Larsson.
Plant Visitations—Louis A. Gale.
Finance—Louis J. Love.
Publicity—Arthur W. Collins.



A. K. Graham
Executive Secretary

General Program

SUNDAY, JUNE 11

4:00 P. M.—Registration, Mezzanine, Hotel Statler.
The registration fee of $10.00 entitles registrant to a book of tickets of admission to certain Convention functions and activities listed in this program.

MONDAY, JUNE 12

8:00 A.M.—Registration, Mezzanine, Hotel Statler.

9:30 A.M.—Opening Session, Georgian Room, Hotel Statler.
Invocation—THE REVEREND FRANK C. MESLE, Rochester Branch.
Welcome to Boston—THE HONORABLE JOHN B. HYNES, Mayor of Boston.
Welcome to Electrodepositors' Technical Society—ARTHUR W. LOGOZZO, President, A.E.S.
Testimonial to Founder Members—DR. GEORGE P. SWIFT, Secretary, Boston Branch.
Greetings from Boston Branch—LOUIS V. GAGNON, President.
Address—DANIEL GRAY, Chief Chemist, Oneida Ltd.
First Business Session—ARTHUR W. LOGOZZO, President, A.E.S., Presiding.

9:30 A.M.—National Association of Metal Finishers, Board of Directors Meeting and Luncheon, Parlor F, Hotel Statler.

12:00 Noon—Educational Committee Luncheon, Terrace Room, Hotel Statler.

12:15 P. M.—International Fellowship Club, 26th Annual Luncheon, Ball Room Foyer, Hotel Statler.
This luncheon is exclusively for suppliers and their representatives.

2:00 P. M.—First Educational Session, Georgian Room, Hotel Statler.

8:30 P. M.—Open House, Imperial Ball Room Suite, Hotel Statler.
Music, Dancing, Buffet (served at 10:00 P.M.). A ticket to this event, which is sponsored by the International Fellowship Club, is included in the Convention book.

TUESDAY, JUNE 13

7:45 A.M.—Educational Committee Breakfast, Cafe Rouge, Hotel Statler.

8:00 A.M.—Registration, Mezzanine, Hotel Statler.

9:00 A.M.—Second Educational Session, Georgian Room, Hotel Statler.

12:00 Noon—Electrodepositors' Technical Society Luncheon, Salle Moderne, Hotel Statler.

S-T-R-E-T-C-H

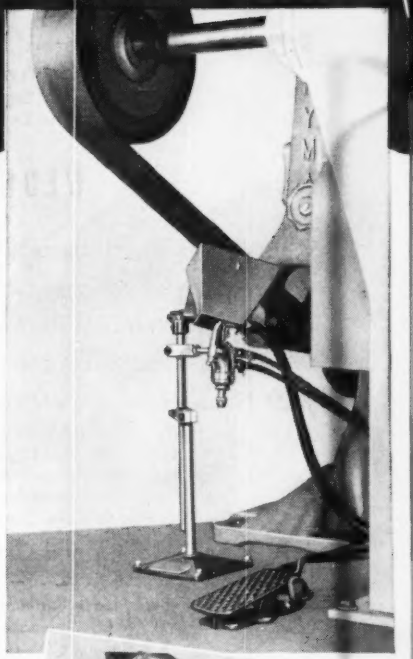
Polishing Belt ENDURANCE!

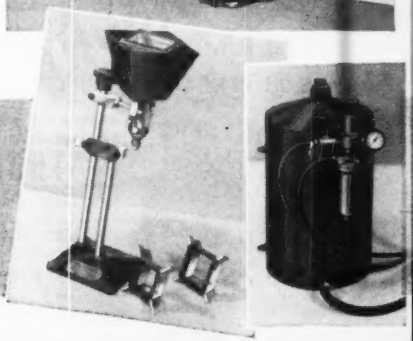
New BELT-LIFE Lubricant Multiplies Belt Performance

Do you want increased polishing belt flexibility? Longer belt life? Would you invest less than half the price of a TV set to get more production, better quality – at lower labor costs?

We thought you would. And that's why we're offering this NEW Vander Wal-Wagner SPRAY-MATIC to progressive metal-finishing plants. SPRAY-MATIC applies our newly formulated BELT-LIFE lubricant to wet or **dry** type belts – automatically – without interrupting polishing operation, as with grease stick application. BELT-LIFE stretches belt productivity because it prevents glazing, prevents loss of abrasive, softens the fabric. This unequalled belt flexibility produces faster, better polishing, especially of concave and convex surfaces.

One user tells us BELT-LIFE has increased belt endurance, polishing steel parts, from three to 21 hours since replacing previous grease stick application. Another, on zinc die-castings, averaged three belts per shift; SPRAY-MATIC-applied BELT-LIFE increased belt productivity to 16½ hours per belt. Both reported higher quality, lowered time.





BELT-LIFE is a specially formulated Wagner Brothers lubrication compound. SPRAY-MATIC consists of a spray gun mounted in baffles which restrict the lubricating spray to the width of belt. Lubricant pressure tank with air regulator, gauge, cleaner and relief valve are included. Foot treadle releases correct amount of BELT-LIFE, atomized by jets in spray gun. Only low pressure air supply is required. Baffles are available for 2", 3", 4" and 6" belts. Installation equally effective on horizontal, vertical or angle set-up.

Write for complete bulletin or call the Wagner representative in your area

Wagner BROTHERS INC.

Wagner Bros., Inc., 432 Midland, Detroit 3, Michigan

Send ☐ SPRAY-MATIC Bulletin
☐ Name of representative in my area

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12:00 Noon—National Association of Metal Finishers, Job Platers' Luncheon, Parlor C, Hotel Statler.

12:00 Noon—Educational Committee Luncheon, Terrace Room, Hotel Statler.

2:00 P. M.—Third Educational Session, Georgian Room, Hotel Statler.

8:00 P. M.—Electroplaters' Night At The Boston Pops, Symphony Hall, Huntington Avenue.

A ticket in the Convention book may be exchanged for a ticket to this event at the Registration Desk any time Tuesday between 10:30 and 7:00 P.M.

WEDNESDAY, JUNE 14

7:45 A.M.—Branch Secretaries' Breakfast, Parlor C, Hotel Statler.

7:45 A.M.—Educational Committee Breakfast, Cafe Rouge, Hotel Statler.

8:00 A.M.—Registration, Mezzanine, Hotel Statler.

9:00 A.M.—Fourth Educational Session, Georgian Room, Hotel Statler.

12:00 Noon—International Fellowship Club Golf Tournament, Tedesco Country Club, Swampscott, Mass.

Chairman: Mr. Joseph J. Duffy, Jr., Pennsylvania Salt Mfg. Co., Philadelphia, Pa. Prizes will be awarded; all handicap groups have a chance to win. Bring your clubs and shoes! Buses leave Statler from Columbus Avenue door; arrange your transportation with the Committee. Adjournment to Clambake after the play.

1:30 P. M.—Outing and Clambake, Thomson Club, Nahant Beach, Nahant, Mass.

Buses leave Statler from Columbus Avenue door. Softball game: East (Champions) vs. West. Clambake at 5:00 P.M. Wear your outing clothes! A ticket to this event is included in the Convention book.

2:00 P. M.—Research Committee Meeting, Parlor D, Hotel Statler.

6:00 P. M.—Research Committee Dinner, Parlor D, Hotel Statler.

THURSDAY, JUNE 15

8:00 A.M.—Registration, Mezzanine, Hotel Statler.

8:00 A.M.—Combined Breakfast, Research and Educational Committees, Parlor C, Hotel Statler.

9:00 A.M.—Fifth Educational Session, Georgian Room, Hotel Statler.

2:00 P. M.—Final Business Session, Georgian Room, Hotel Statler.

7:00 P. M.—Annual Banquet, Imperial Ball Room Suite, Hotel Statler.

Dinner, Golf Prizes, Awards, Entertainment, Music, Dancing. A ticket to this event is included in the Convention book.

ROBINSON'S *Assayed* GOLD PLATING SOLUTIONS and SALTS and PALLADIUM PLATING SOLUTION

FULL RANGE of PRECIOUS METALS for PLATING for Industrial and Decorative Uses!

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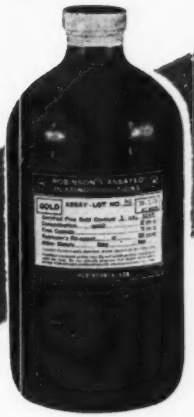

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Ladies' Program

SUNDAY, JUNE 11

4:00 P. M.—Registration, Mezzanine, Hotel Statler.
The registration fee of $10.00 entitles registrant to a book of tickets of admission to certain Convention functions and activities listed in this program.

MONDAY, JUNE 12

8:00 A.M.—Registration, Mezzanine, Hotel Statler.

12:30 P. M.—Parlor C, Hotel Statler.
Ladies will meet for an informal "get-acquainted" gathering before leaving for the tour of Boston.

1:00 P. M.—Sight-Seeing Tour, Historic Boston, Cambridge, Harvard University.
Buses leave Hotel Statler from Columbus Avenue door.

3:30 P. M.—Open House, Imperial Ball Room Suite, Hotel Statler.
Music, Dancing, Buffet (served at 10:00 P.M.) A ticket to this event, which is sponsored by the International Fellowship Club, is included in the Convention book.

TUESDAY, JUNE 13

8:00 A.M.—Registration, Mezzanine, Hotel Statler.

12:30 P. M.—Guided Tour and Tea, The Wayside Inn, Sudbury, Mass.
Auspices of M. E. Baker Company. Buses leave Hotel Statler from Columbus Avenue door. A ticket to this event is included in the Convention book.
This is the good old inn made famous by Longfellow's "Tales", carefully restored to its condition of the Longfellow period by Henry Ford. The little red schoolhouse in the vicinity, the grist mill where corn meal is actually ground for sale, the whole vicinity are now a faithful representation of what the Inn looked like at the time the famous poem "Paul Revere's Ride" was written.

8:00 P. M.—Electroplaters' Night at The Boston Pops, Symphony Hall, Huntington Avenue.
A ticket in the Convention book may be exchanged for a ticket to this event at the Registration Desk any time Tuesday between 10:30 and 7:00 P.M.

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WEDNESDAY, JUNE 14

8:00 A.M.—Registration, Mezzanine, Hotel Statler.

10:00 A.M.—Educational Session and Plating Demonstration, Salle Moderne, Chairman, Louis V. Gagnon, President, Boston Branch.

1:30 P. M.—Outing and Clambake, Thomson Club, Nahant Beach, Nahant, Mass.

Buses leave Hotel Statler from Columbus Avenue door.

International Fellowship Club's "Plato" Party, under the direction of Joan Trumbour Wiarda. Prizes. Clambake at 5:00 P.M.

Wear your outing clothes! A ticket to this event is included in the Convention book.

THURSDAY, JUNE 15

8:00 A.M.—Registration, Mezzanine, Hotel Statler.

12:30 P. M.—Aunt Ella's Society Luncheon Party, Vienna Room, Steuben Restaurant, 114 Boylston St.

Sponsored by Oakite Products, Inc., David X. Clarin, Secretary. A ticket to this event is included in the Convention book.

7:00 P. M.—Annual Banquet, Imperial Ball Room Suite, Hotel Statler.

Dinner, Awards, Music, Entertainment, Dancing. A ticket to this event is included in the Convention book.

(Left) Minute Man Statue, erected to the heroes "who fired the shot heard round the world"; (center) Bunker Hill Monument; (right) Old North Church from which Paul Revere received the lantern signals warning of the approach of the British.

Set new standards in production and work finish

From day to day, production finishing requirements are becoming more critical. The demand for faster, better work becomes more insistent. That's why it's important to find the finishing materials and methods that will push your production up to the peak and keep it there.

It will pay you to learn why Stevens "Job-Qualified" metal finishing materials and methods are accomplishing such outstanding results for the leaders in your industry today—and more important, how similar materials and methods can solve your production finishing problems.

There is a nearby Stevens Sales and Service Representative eager to work with you—capable by experience and ability to recommend "qualified-to-do-the-job" materials and methods—and then follow through as needed. The value of Stevens Buffing Service is already written in the finishing production records of many manufacturers who are working today under greater pressure than ever before.

Stevens' Finishing Productioneers and laboratory staff have helped them break some very tough production bottlenecks . . . usually with a *plus* of increased production, better finish and lower operating costs. *It's the kind of a job we'd like to do for you.* What's your problem?

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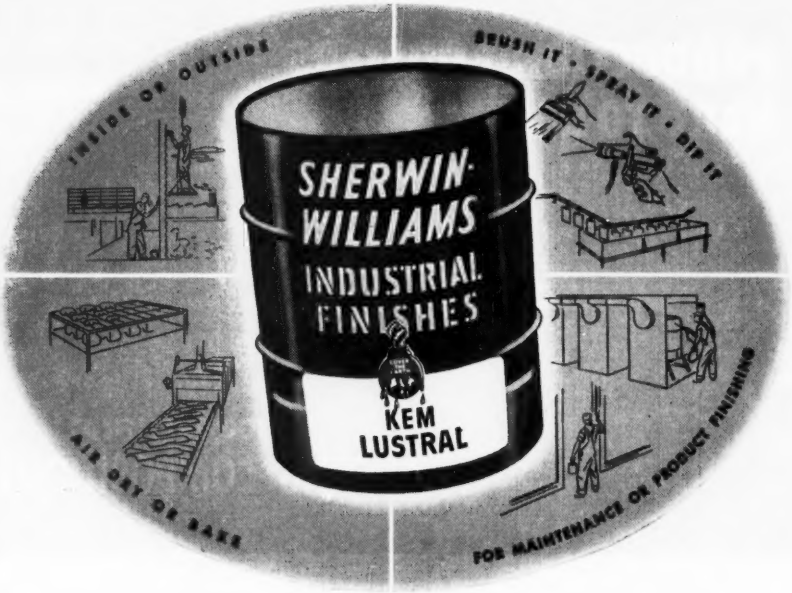

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- **KEM ARTMETAL (WRINKLE) FINISHES**

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Call your Sherwin-Williams branch store—get acquainted with them and with this flexible, quality coating! The Sherwin-Williams Co., Industrial Division, Cleveland 1, Ohio.

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A new and finer finish . . . with new, high resistance to cold checking . . . new durability . . . new all-round performance!

Television posed new problems for cabinet manufacturers. The large number of power tubes caused wide changes in temperature and moisture content of the wood. Ordinary cabinet finishes cracked and checked.

Sherwin-Williams Wood Finish Technicians developed one of the first lacquers to solve this and similar problems. This finish —Television Lacquer—has now been thoroughly tested for more than two years in the laboratory and in service on leading makes of television sets, with outstanding results.

Television Lacquers and Sealers are extremely tough and flexible. In cold check tests they have been subjected to alternating temperatures from oven to freezer—one hour at 125° then one hour at zero —for 31 cycles with no indication whatever of cold check. They are water-white, light-fast, do not darken or change color, have excellent build and clarity. They are recommended for light or dark woods, not only for radio and television, but for any furniture where highest durability and quality of finish is desired.

Get full details—write The Sherwin-Williams Co., Industrial Division, Cleveland 1, Ohio.

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Educational Program

FIRST SESSION

Monday Afternoon, June 12, 2:00 P. M.

Georgian Room, Hotel Statler

LEONARD E. WEEG, National Lock Company, Presiding

1—"The Self-Regulating High Speed Chromium Plating Bath".
By DR. J. E. STARECK, H. MAHLSTEDT, and F. PASSAL, United Chromium, Inc.

2—"The Nodule Method of Measuring Adhesion of Electrodeposited Coatings".
By DR. ABNER BRENNER and VIRGINIA D. MORGAN, National Bureau of Standards.

3—"Advances in Electrodeposition in The Graphic Arts".
By E. I. PETERS, Pontiac Engraving & Electrotype Company.

4—"High Speed Nickel Plating of Curved Stereotypes".
By KENNETH L. KOESSLER and ROBERT R. SLOAN.

5—"Electroplating and Metal Finishing Developments in Germany, 1940-1950".
By DR. RICHARD SPRINGER, Spezialwerk fuer Galvanotechnik, Leipzig, Germany.

Abstracts of Preceding Papers

The Self-Regulating High Speed Chromium Plating Bath—Dr. J. E. Stareck, H. Mahlstedt, and F. Passal.

The operating characteristics of a new chromium plating solution are compared with those of the conventional chromic acid-sulfate solution. The principle of automatic regulation of the catalyst content is discussed. Graphs, data, photomicrographs, profilometer records, and photographs serve to compare the following characteristics of the two solutions and the deposits produced in them over a wide range of plating conditions: current efficiencies and plating speeds; scratch hardness, microscopic appearance, and smoothness of deposits; and coverage of nickel plated production pieces. The effect of these characteristics in commercial production is shown.

The Nodule Method of Measuring Adhesion of Electrodeposited Coatings—Dr. Abner Brenner and Virginia D. Morgan.

A method of measuring the adhesion of eletrodeposited coatings of commercial thickness has been developed. It involves the electroforming on the surface of the coating of a mushroom-shaped projection, or nodule, of cobalt which serves as a grip for detaching the coating. The nodule is detached with a simple device, consisting of a chuck and a strong spring, and the force of detachment, or adhesion, is measured in pounds per square inch. In practically all cases the coating is detached with the nodule. The electroformed nodule is about 1/16-inch in diameter

New Creations

IN METAL FINISHING

METAL STRIPPER — A

An outstanding development for stripping defective electroplated nickel, copper, silver, cadmium and zinc from steel. Fast action . . . no basis metal attack. The highly polished grill cover illustrated has been completely stripped of nickelplate, and is ready for re-plating *without repolishing.*

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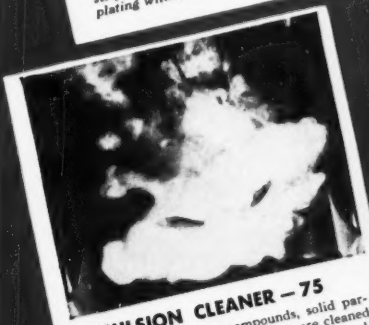
Ebonol finishes are used to beautify a widely diversified list of superior quality products. Photo shows steel parts blackened with Ebonol-S and S-30; copper and brass with Ebonol-C; zinc with Ebonol-Z. U. S. Patents — 2,364,993, 2,460,896, 2,460,898.



EMULSION CLEANER — 75

Oils, greases, buffing compounds, solid particles, deep seated in steel parts are cleaned out and completely removed by this emulsification process. Stubborn, gummy substances on die castings, milling machines, floors, motor blocks emulsify and disperse in water instantly.

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Enthone has over 20 strippers for removing organic finishes — synthetic enamels, lacquers, vinyls, japans. The best strippers, tailor-made for your particular problem, are selected by laboratory technicians after test runs. This service is rendered free of charge.

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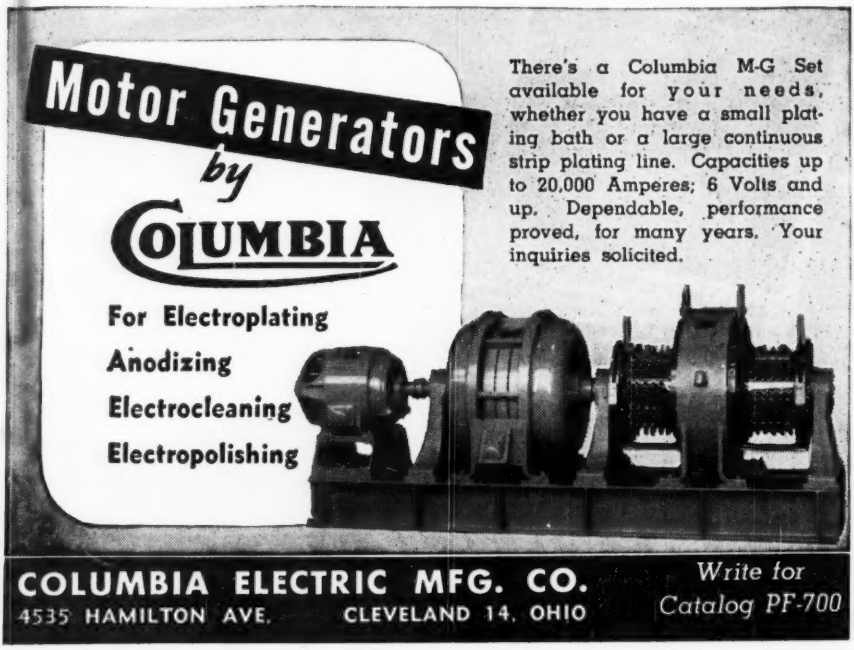
and about 1/32-inch high. Three to four hours are required for the formation of the nodule, and the complete test on a specimen can be made during one work day. The method is probably useful for laboratory examination of specimens but not as a rapid routine method for plant control.

Advances in Electrodeposition in The Graphic Arts—E. I. Peters.
Various graphic arts are defined, and the role of electroplating is given for each. A number of technological advances are then described, including chromium plating and nickel plating (in the nickel chloride-acetate bath) of stereotypes; use of the cobalt-nickel solution in electrotyping; tin plating of electrotype shells; use of the copper fluoborate bath in electrotyping and rotogravure-cylinder plating; iron deposition in electrotyping and manufacture of engraving plates; and zinc plating of deep-etch offset lithographic plates.

High Speed Nickel Plating of Curved Stereotypes—Kenneth I. Koessler and Robert R. Sloan.
A report is presented on the applicability of a nickel fluoborate solution, containing about 7.5 oz./gal. nickel and 2 oz./gal. free boric acid, to the plating of stereotypes. A 700-gallon tank was run in production for 60 days. During this time one-half of the stereotype plating was carried out in the fluoborate bath, and at the end a complete change to fluoborate was made because of ease of control, high plating speed (0.0005 inch in 7.5 minutes), economy of heating, high anode and cathode efficiencies, stability of pH, cleanliness and absence of odor in operation, low power and chemical cost, substantial absence and ease of control of pitting. Details of the preparatory cycle are given.

Electroplating and Metal Finishing Developments in Germany 1940-1950—Dr. Richard Springer.
The paper covers the war time and the time after the war. It describes developments in cleaning and pickling; deposition of nickel, chromium, zinc, silver, gold, and iron; oxidation of aluminum, magnesium, iron, and alloys of these metals; phosphatizing; methods of examining coatings; and other fields.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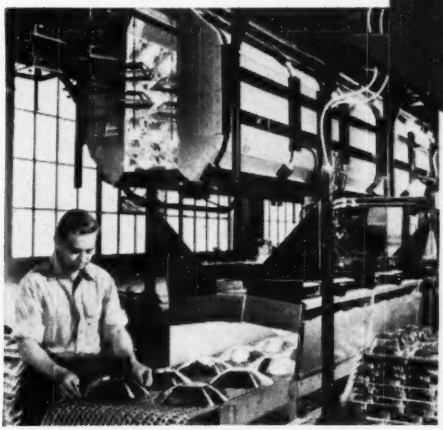

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SECOND SESSION

Tuesday Morning, June 13, 9:00 A.M.
Georgian Room, Hotel Statler

MYRON B. DIGGIN, Hanson-Van Winkle-Munning Company, and DR. GEORGE P. SWIFT, Consultant, Presiding

SMOOTHING AND LEVELING OF ELECTRODEPOSITS, PART I

1—"Measurement of Surface Smoothness".
By DR. H. J. KELLNER, Lea Manufacturing Company.

2—"Measurement of Surface Roughness with the Interference Microscope."
By ARTHUR G. STRANG and FIELDING OGBURN, National Bureau of Standards.

3—"Leveling and Smoothing by Electropolishing and Chemical Polishing".
By DR. C. L. FAUST, Battelle Memorial Institute.

4—"Leveling with PR Current Plating".
By G. W. JERNSTEDT, Westinghouse Electric Corporation.

5—"Some Observations of the Microthrowing Power of Plating Solutions".
By C. E. REINHARD, New Jersey Zinc Company.

Abstracts of Preceding Papers

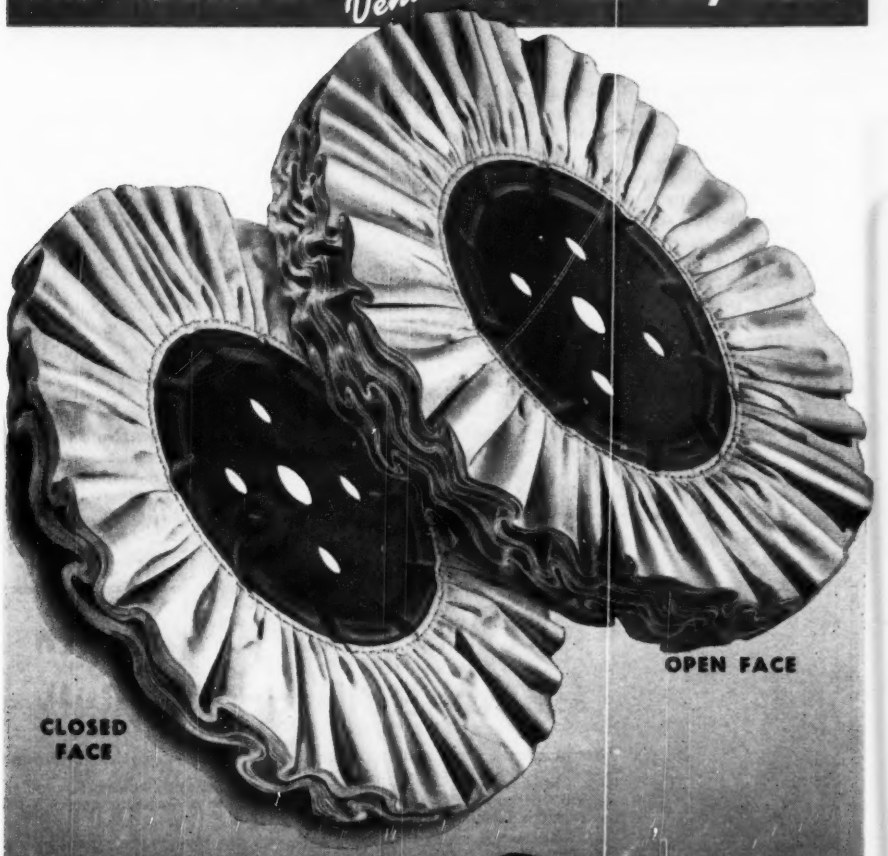
Measurement of Surface Smoothness—Dr. H. J. Kellner.

This introductory paper is written to eliminate duplication of description of measuring techniques in the papers that follow. The methods described include: (1) microscopic methods (a) for surface examination by perpendicular viewing with oblique lighting parallel to and perpendicular to scratches, and by oblique viewing with lighting perpendicular to surface, and (b) for examination of cut edge mounted in plastic, ground, polished, and etched by usual metallographic procedure, either perpendicularly or at an angle to the surface; (2) tracer methods by the Brush Analyzer and the Profilometer, and comparison of results obtained; and (3) the replica method, both comparison of replicas with Fax Film equipment and evaluation of replicas by Herschman apparatus.

Measurement of Surface Roughness with the Interference Microscope—Arthur G. Strang and Fielding Ogburn.

The Zeiss interference microscope which combines into one instrument the microscope and the interferometer can be used to study and measure the smoothness of electrodeposited surfaces. With this instrument, the height and depth of surface imperfections, such as fine scratches or microscopic nodules and pits, can be measured over the range of 2-80 micro-inches. The surface can be inspected with a magnification of 664X and can be scanned as with a microscope. Photographic records can be made of small areas about 0.009 inch in diameter. No special preparation of the surface being examined is required.

The CODMAN *Ventilated* Non-Fray BUFF



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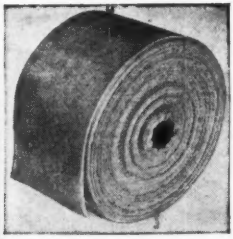
Leveling and Smoothing by Electropolishing and Chemical Polishing—Dr. C. L. Faust.
Data are supplied on the microroughness as revealed by Profilometer, Brush Surface Analyzer, and reflectivity measurements, as well as microscopic examination, before and after electropolishing and chemical polishing of steel, brass, and aluminum base metals, and before and after chemical and electrobuffing of nickel plate. The value of these treatments in providing adhesion of electrodeposits is also shown.

Leveling with PR Current Plating—G. W. Jernstedt.
Mechanical, chemical, and electrochemical methods of leveling are reviewed. The fundamental factors affecting leveling with PR plating, such as PR cycle, current density, thickness of deposit, agitation, solution composition, addition agent, and contamination, are described. Particular consideration is given to the elimination of buffing in the appliance and automotive fields by polishing the base metal in the flat and by providing increased leveling in the plating bath. The effect of leveling with the PR process on orange peel resulting from drawing operations is set forth. The leveling possible with heavy deposits, such as the 0.040-inch thick stamper employed in the record industry, is also described.

Some Observations of the Microthrowing Power of Plating Solutions—C. E. Reinhard.
In an earlier study of plated metal-powder compacts it was found that the deposits extended into surface and subsurface voids, sometimes into labyrinths several thousands of an inch deep. There appeared to be marked differences in the extent to which this occurred with different plating solutions. Illustrations of these deposits are shown. A series of tests are then described which were performed in an attempt to establish the factors controlling microthrowing power by means of systematic variations of plating conditions in several nickel solutions. Specimens with specially prepared grooves of a size corresponding to some of the surface voids in compacts were used. A complete explanation has not been derived, but the effects of several variables are shown. Photomicrographs of deposits made on the standardized grooves are presented. They include copper, nickel, zinc, and chromium coatings on brass and a few of these deposits on copper, steel, and silver basis metals.



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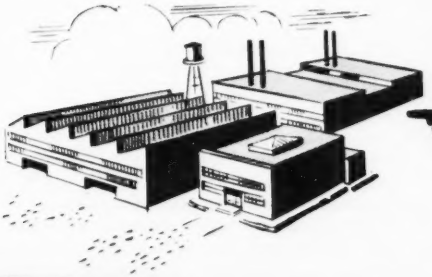
Also Individually Packed in Glassine Envelopes—144 to the Carton

— A WARRANTY OF SATISFACTION IN EVERY CARTON —

how can this
LITTLE PLANT
produce as many
metal parts...



as this
LARGE
factory?

the answer...

★ALVEY-FERGUSON
Washing Machines for Industry

THE ALVEY-FERGUSON CO.
625 DISNEY ST., Cincinnati 9, OHIO
Offices or Representatives in Principal Cities

Write for
FREE Catalogue
TODAY!

THIRD SESSION

Tuesday Afternon, June 13, 2:00 P.M.
Georgian Room, Hotel Statler

MYRON B. DIGGIN, Hanson-Van Winkle-Munning Company, and DR. GEORGE P. SWIFT, Consultant, Presiding

SMOOTHING AND LEVELING OF ELECTRODEPOSITS, PART II

6—"Leveling in Cobalt-Nickel Plating Solutions".
By DR. L. WEISBERG, Consultant.

7—"Surface Contour and Leveling".
By A. H. DuROSE, W. P. KARASH, and DR. K. S. WILLSON, The Harshaw Chemical Company.

8—General Discussion of Leveling.

Abstracts of Preceding Papers

Leveling in Cobalt-Nickel Plating Solutions—Dr. Louis L. Weisberg.
Composition and operating details of cobalt-nickel plating solutions with leveling properties are described. Bright or semi-bright deposits with substantially the same degree of leveling may be obtained. Good leveling is favored by high temperature, vigorous agitation, and high metal content. Nickel chloride over about 8 oz./gal. is detrimental, as are also various metallic and organic impurities and ammonium compounds. Formic acid accounts for the main leveling effect. Formaldehyde is used to obtain brightness but does not affect leveling. Physical properties and corrosion resistance are substantially the same as those of cobalt-nickel deposits from solutions in general use.

Surface Contour and Leveling—A. H. DuRose, W. P. Karash, and Dr. K. S. Willson.
Methods and meaning of measurements used in the tests reported in this paper are briefly reviewed. Leveling due to inherent properties of a bath is treated, with consideration of mathematical and geometric approaches, including atomic-force characteristics. Relationship between thickness of the deposit and leveling for various solutions is discussed. Results are given to demonstrate methods for evaluating the relative contribution of "flowing" and "cutting off" of metal in the buffing process. The effect of surface texture and hardness on ease of buffing is discussed briefly. The lack of fundamental information is pointed out.

FELT DOES IT BETTER

Paramount Brand

FELT WHEELS

• *Quality* • *Better Work* • *Uniformity*

Order PARAMOUNT BRAND Felt Wheels from your supplier. Also, bobs and sheets whenever you need them.

BACON FELT CO. WINCHESTER, MASS.

Established 1824

"America's Oldest Felt Manufacturer"
Send for our Complete Catalog

Wheels CUT FASTER, LAST LONGER

When treated with

Park

KOLD-GRIP

POLISHING WHEEL CEMENT

KOLD-GRIP Polishing Wheel Cement, laboratory-controlled through every step of production, will arrive at your plant *ready for use!* Viscosity is constant, regardless of normal temperature variations and the cement can be applied directly from the container . . . *without mixing or heating.* Kold-Grip is clean, odorless and very easy to handle.

Coarse or fine-grain abrasives set up right for fast cutting efficiency. Substantial savings are effected through longer over-all wheel life, fewer set-ups and reduced wheel inventory.

Wheels dry rapidly, are unaffected by humidity changes, and may be stored in any convenient plant area.

Let our polishing engineer demonstrate Kold-Grip for you, or send for free sample, telling us the metal to be polished, grain sizes to be used, and drying facilities available. We can help you if we hear from you.

Park

CHEMICAL COMPANY
8074 Military
Detroit 4, Mich.

FOURTH SESSION

Wednesday Morning, June 14, 9:00 A.M.
Georgian Room, Hotel Statler

WALTER L. PINNER, Houdaille-Hershey Corporation, Presiding

1—"Metal Finishing by Abrasive Tumbling".
By HUBERT M. GOLDMAN, Enthone, Inc.

2—"Abrasive Belt Polishing".
By E. E. CATHOUT, Behr-Manning Corporation.

3—"Flat Polished Phosphate Coated Steel Reduces Polishing Cost".
By H. J. McVEY and V. M. DARSEY, Parker Rust Proof Company.

4—"Water Base Buffing Liquid".
By E. T. CANDEE and S. L. DOUGHTY, JR., The Lea Mfg. Company.

Abstracts of Preceding Papers

Metal Finishing by Abrasive Tumbling—Hubert M. Goldman.
Theoretical and practical information is presented on tumbling techniques involving the use of abrasives where actual cutting down of metallic surfaces is desired. Production and experimental operations are specifically described. Theoretical aspects noted have been carefully checked as to practicability. Burnishing practices are not included unless they automatically accompany truly abrasive operations. Data are presented on the use of artificial and natural abrasives as media and on non-abrasive media which do not fall within the realm of burnishing materials. A study of tumbling equipment is also included.

Abrasive Belt Polishing—E. E. Cathout.
Factors in the choice of equipment, heads, and belts are discussed. Case histories are presented which give details of the procedure used and the advantages gained in lower cost and higher rates of production.

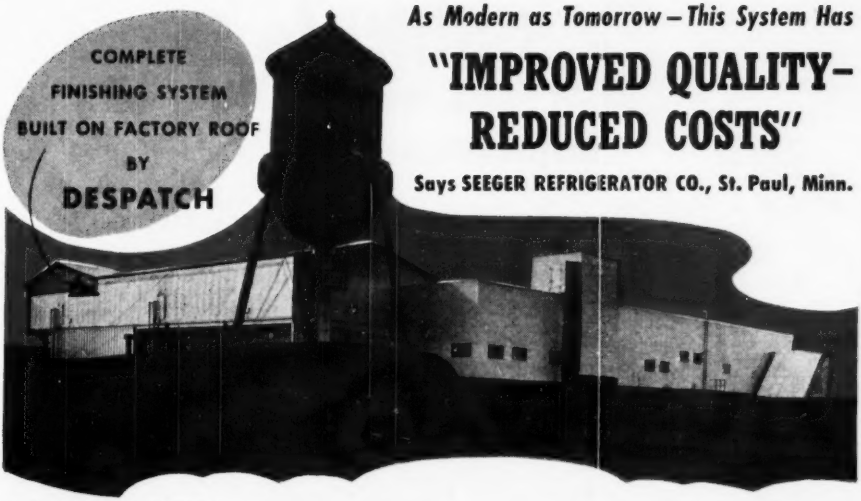
Flat Polished Phosphate Coated Steel Reduces Polishing Cost—H. J. McVey and V. M. Darsey.
Automatic polishing of steel in the flat followed by phosphate coating and lubrication to protect the surface during the forming operation has sufficient economic advantages over polishing of formed articles that a part of the automobile industry has turned to this method for bumpers and other parts. The steps in this procedure, including the cleaning prior to phosphating, are discussed, and the advantages are presented.

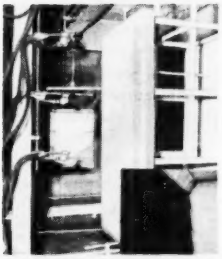
Water Base Buffing Liquid—E. T. Candee and S. L. Doughty, Jr.
The history and present practice of buffing with bar compounds are presented, including their advantages and disadvantages. Data are given on characteristics of water-base buffing liquids, their application and economy and on types of equipment and their application. Information is included to help the manufacturer decide what type of compound to adopt for each product.

As Modern as Tomorrow – This System Has

"IMPROVED QUALITY–REDUCED COSTS"

Says SEEGER REFRIGERATOR CO., St. Paul, Minn.





Specially built Despatch uniform air velocity booth. Inset shows split curtain.

MAINTENANCE COSTS REDUCED 25%

Higher production and quality at greater savings in labor and paint have been achieved, together with about 25% lower maintenance costs, with this finishing system designed, built and installed by DESPATCH. Normal output is 80 cabinets, 30 freezers, plus parts per hour.

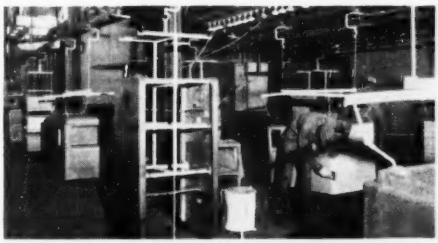
3500-ft. CONVEYOR OPERATES ON 4 FLOORS

This continuous chain conveyor carries ware thru 17 stations, delivering it to assembly lines. Among units of the system are 3 DESPATCH convection heated ovens of bottom entry-exit type making natural and effective air seals. Burners are direct fired with either gas or oil.

ELECTROSTATIC SPRAYING

Two DESPATCH uniform air velocity booths, specially designed for electrostatic spraying are employed for prime and finish coats. Rear wall filters and split water curtain provide uniform air flow, preventing stratification and air turbulence. Water up to 50-gals. per min. per lineal ft. minimizes paint accumulation. A 5-stage fresh air make-up system with 135,000 CFM blower distributes air to spray booths and oven heaters.

DESPATCH engineers will work with you on a single unit or a complete system. WRITE TODAY for Bulletin 51C or request a representative to call.



General view of the prime coat sanding area.

DESPATCH OVEN COMPANY

Minneapolis Offices: 619 S. E. 8th Street.
Chicago Office: 7070 No. Clark Street.

FIFTH SESSION

Thursday Morning, June 15, 9:00 A.M.

Georgian Room, Hotel Statler

B. C. CASE, Hanson-Van Winkle-Munning Company, Presiding

1—"Reporting and Use of Research Data."
By G. M. COLE, Ternstedt Division, General Motors Corporation.

2—"Why Pay for Porosity Research?"
By DR. W. A. WESLEY, The International Nickel Company.

3—"Use of Radioactive Isotopes for Determination of Current and Metal Distribution in Electrodeposition."
By DR. JOHN KRONSBEIN, Evansville College.

Abstracts of Preceding Papers

Reporting and Use of Research Data—G. M. Cole.

It is important that the membership understand and make full use of reports emanating from A.E.S. research projects. The immediate usefulness of the reports on the research work as it progresses varies with the nature of the work. Some are complete and independent, such as an analytical procedure from Project No. 2. Another may be of immediate use although not independent of other reports, such as one from Project No. 5 on "The Effect and Removal of Copper from Nickel Plating Solutions". Others, such as those from Project No. 6 require study and interpretation before practical applications can be expected.

Why Pay for Porosity Research?—Dr. W. A. Wesley.

In spite of the fact that over 100 laboratories in the United States are doing experimental work in electrodeposition there is an urgent need for fundamental research in this field. The reason is that an industry cannot continue to advance through applied technical research and development when the supply of new scientific knowledge dwindles. This seems to have been the situation with regard to porosity research. The significance to the plating industry of the work on porosity sponsored by the A.E.S. is brought out by discussion of its seven important new contributions to fundamental knowledge of the nature of porosity. Eight specific clues, or ideas, emanating from reports by Project No. 6 are already stimulating new technical research on the protective value of electrodeposits.

Use of Radioactive Isotopes for Determination of Current and Metal Distribution in Electrodeposition—Dr. John Kronsbein.

A known fraction of radioactive copper 64 is introduced into a copper sulfate solution, from which copper is deposited upon a cathode at a known average current density. The cathode is then cut into strips, and the amount of codeposited radioactive copper is determined by means of a Geiger Counter. The distribution of radioactive, and therefore also of stable, copper on the cathode can thus be established within very close limits. Extremely thin deposits may be deposited and yet satisfactory distribution determinations made. The method is especially suitable for ascertaining primary current distribution on an electrode. Another method to illustrate primary metal distribution by means of radioactive isotopes is to proceed as above with the application of part radioactive and part stable copper in known proportions and then to use the radio autographic technique of photographing the disintegrating copper atoms. At those parts of the cathode where most copper is deposited there will be most disintegrations and consequently the photographic film will be most blackened. Techniques are described and sources of errors pointed out.

THE Balanced Solvent

BLACOSOLV

STABILIZED *NOT* ALKALIZED

ONE solvent, ONE price for all jobs

The new Blacosolv is the most stable solvent we've ever offered for metal degreasing. Aluminum, steel, copper and precious metals may be safely and scientifically degreased with the same solvent.

Blacosolv contains a mixture of entirely new and different stabilizers. They are not alkaline materials which neutralize acid *after* breakdown. They are new stabilizers that *prevent* solvent breakdown and possible acid formation. Contains no alkaline materials that can be mistaken for stability . . . no masking agents are added.

G. S. BLAKESLEE & CO.

BLACOSOLV
DEGREASERS AND SOLVENT

NIAGARA
METAL PARTS WASHERS

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS
NEW YORK, N. Y. TORONTO, ONT.

Favorite Eating Places In Boston

Self-Service

Albiani Lunch, Inc., opposite South Station; 7 School Street, near City Hall; 151 Huntington Avenue, adjoins Mechanics Building; 10 Scollay Square; 632 Washington Street.

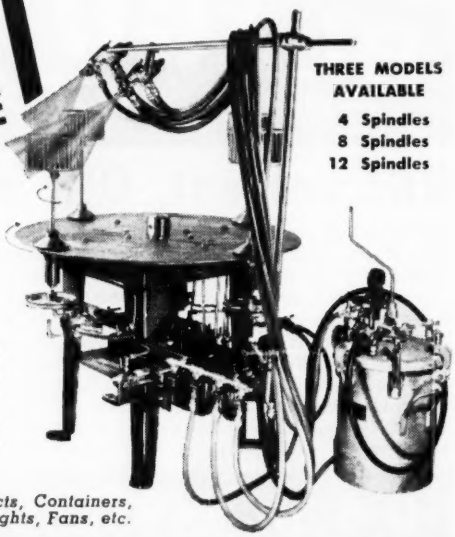
Hayes-Bickford Lunch System, Inc., 675 Atlantic Avenue, opposite South Station; 133 Causeway Street, opposite North Station; 185 Tremont Street at Boylston Street; 272 Boylston Street, and 53 Providence Street, opposite Hotel Statler; 26 Huntington Avenue; 1040 Boylston Street.

Sharaf's Inc., 91 Causeway Street; 171 Newbury Street; 19 Charles Street; 187 Massachusetts Avenue; Gainsborough and Huntington Avenue. Specialty: "Down-East" Apple Pie.

St. Clairs' Restaurants, 144 Federal Street.

Walton Lunch Company, 204 Dartmouth Street; 437 Boylston Street; 105 Causeway Street; 572 Washington Street; 540 Commonwealth Avenue. Specialty: Boston baked beans.

HOLLAND
automatic-pneumatic
SPRAYING MACHINE



THREE MODELS AVAILABLE
4 Spindles
8 Spindles
12 Spindles

- **GIVES AN EVEN FINISH**
- **SPEEDS UP PRODUCTION**
- **IMPROVES QUALITY OF PRODUCT**

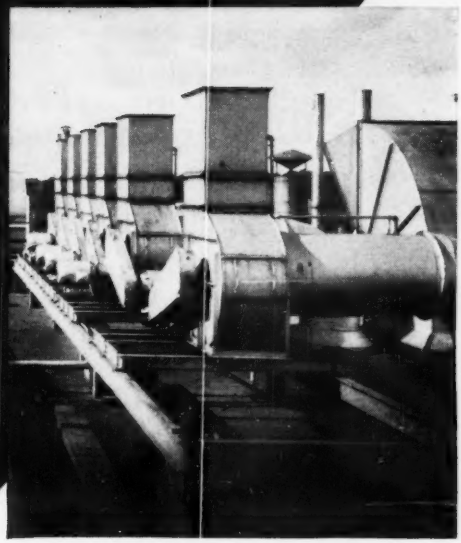
This new fully automatic, portable spraying machine is activated *solely* by air pressure. Only one operator is needed to load, and remove finished and unfinished work. WRITE FOR FULL INFORMATION.

Ideal for spraying: Cans, Novelties, Compacts, Containers, Aluminumware, Electrical Appliances, Flashlights, Fans, etc.

J. HOLLAND & SONS, INC. ▪ 276 SOUTH 9th ST., BROOKLYN 11, N. Y.

For Better Working Conditions in Paint Spray Departments

Be Sure - specify "Buffalo" FANS ON YOUR EXHAUST SYSTEMS



"BUFFALO" INDUSTRIAL EXHAUSTERS
("MW" for Material Handling,
"AW" for more efficient Air Handling.)

• DEPENDABLE — "Buffalo" Fans have earned this reputation in every industry in exhaust systems.

• EFFICIENT—a complete range of centrifugal and axial flow fans, a satisfactory fan for *your* particular installation.

• LOWER COST IN THE LONG RUN!—"Buffalo" Fans are long-lasting and simple to service — saving on both power and maintenance.

First For Fans • ***WRITE FOR FACTS!***

BUFFALO "FORGE" COMPANY

536 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Branch Offices in All Principal Cities

VENTILATING AIR WASHING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

Steaks and Chops

Circle Lounge & Grille, Inc., 1960 Beacon Street. Specialties: lobsters, steaks and chops.

Newbury's Steak House, 279-A and 279-B Newbury Street.

Red Coach Grill, 43 Stanhope Street. Specialty: Charcoal broiled steaks.

Steuben Restaurant, 114 Boylston Street.

New England Specialty Restaurants

Howard Johnson's Ice Cream Shops and Restaurants, on main highways and principal streets. Specialties: Howard Johnson fried clams, grilled frankforts, New England dishes, and ice cream.

Brittany Coffee Shop, 222 Newbury Street. Specialties: Cape Cod clam chowder, fish cakes, and Boston baked beans.

Blue Ship Tea Room, 27 and 28 T Wharf. Specialties: chowders, broiled fish, fresh crab salads, baked chocolate pudding with hard sauce.

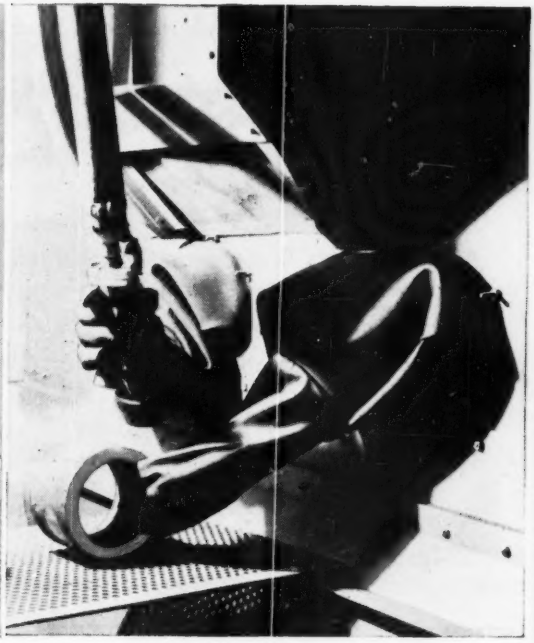
Colonial Kitchen, 43 Charles Street. Specialty: New England cooking served family style.

Dinty Moore's, in the alley off Avery Street, rear of Astor Theatre.

Durgin-Park, 50 North Market Street. Specialty: "Real Yankee Cooking."

Paul Revere Statue (left), Faneuil Hall, known as "The Cradle of Liberty," one of the few buildings in Boston still in its original condition.

Check these Important Advantages of BLASTITE Grain



The individual particles of BLASTITE fused aluminum oxide grain are sharp, angular and tough. They abrade faster, last longer and may be reused many times. Because they are 50% heavier by volume, efficient operation is maintained with lower air pressures. They may be used on a wide range of materials, including stainless steel and nonferrous metals. Surfaces are left clean and open, not peened, to provide an excellent base for organic or metallic coatings. BLASTITE grain is not affected by moisture... and will not clog airlines and connections. Costly repairs and down-time are avoided.

Improved efficiency and worthwhile economy result. Reason enough to get detailed information from your jobber or by writing direct. The Carborundum Company, Bonded Products and Abrasive Grain Division, Niagara Falls, N.Y.

THE COMPLETE LINE... *Abrasive Grain and Powders*

by **CARBORUNDUM**

TRADE MARK

"Carborundum" and "Blastite" are registered trademarks which indicate manufacture by The Carborundum Company

The English Room, 29 Newbury Street. Specialty: fried boneless chicken with waffle.

The Hi-Da-Way, 3 Boylston Place. Specialties: New England cooking, Baked Indian Pudding and Baked Apple Crisp.

Locke-Ober Cafe, 3 and 4 Winter Place, 1 block from Park Street Subway. Established in 1875.

Patten Restaurant, 41 Court Street. Specialty: New England cooking.

Purcell's Inc., 25 School Street. Specialties: individual plank steak, Purcell's cream chicken en casserole, lobster thermidor, and beef stew.

Salmagundi, 222 Beacon Street. Specialties: New England foods.

Warmuth's Restaurant, 278 Devonshire Street. Specialties: New England foods.

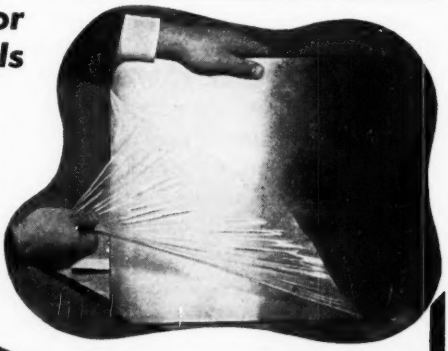
"39 Newbury," 39 Newbury Street. Specialties: Boston home cooking, almond crunch pie, and strawberry rhubarb pie.

Down-Town Restaurants

Childs' Dining Hall Company, 177 Tremont Street; 240 Boylston Street; 258 Huntington Avenue.

A Strippable Plastic for the Protection of Metals

Striplastic is a protective plastic applied by spraying, dipping or rolling. It is used on stainless steels, high polished metal sheets, sheets in cold working or drawing, tools, dies and parts, and on sheets or metal parts before packaging. It protects against scratching and abrasion, and against rust. Also available as a booth coat protection.



THE STRIPLASTIC COMPANY
10828 QUEBEC AVE.
CLEVELAND 6, OHIO

Among many advantages, it is non-toxic, possesses great tensile strength and is easily stripped off in one piece. Write for complete information on this new strippable plastic.

AEROVOX says

"We've never found a finish to equal KIRKER!"

Like many manufacturers of quality products, Aerovox Corporation of New Bedford, Mass., maker of the world's most complete line of capacitors for radio and electronic equipment, have used an air-drying, Kirker spray coating for many years.

This finish was "fitted" to product requirements by Kirker, and has given fully satisfactory service. Perfect color match, resistance to chipping, and excellent adhesion are its primary characteristics.

Kirker is well prepared, from the standpoint of equipment and experience, to develop and produce the perfect coating for your product. The quantity need not be large.

May we hear from you?

KIRCO MODERN COATINGS

Kirker CHEMICAL COMPANY

ONE EAST ELEVENTH STREET • PATERSON 4, NEW JERSEY

The Country Plate, Inc., 195 Tremont Street. Specialties: individually baked chicken pie and home made ice cream pie.

Huyler's, 146 Tremont Street; 14 Milk Street.

New Adams House, 533 Washington Street. Specialty: sea food.

Schrafft's, 98 Boylston Street; 356 Boylston Street; 16 West Street; 11 Summer Street; 81 Milk Street.

Rosoff's Restaurant Company, 97 Summer Street. Daily specials.

Fish and Sea Foods

The Gateway South Station Restaurant, South Station. Specialty: Cotuit oysters.

Lobster Claw, 280 Huntington Avenue. Specialties: baked oysters and broiled lobsters.

Dini's Sea Grill, 94 Tremont Street. Specialties: lobsters, fresh sea food, steaks, and chops.

Pieroni, Inc., 7 Park Square; 601 Washington Street; 13-15 Stuart Street. Specialty: sea food.

Union Oyster House Inc., 41 Union Street; 143 Stuart Street; 124 Canal Street. Established in 1826.

(Courtesy "Favorite Eating Places," edited by Gretchen McMullen, and published by The Convention and Visitors Bureau, Boston Chamber of Commerce)

SLASH MAINTENANCE COSTS!

by using

PLASCOTE NO. 1

The new peelable plastic boothcoating.

- Actual using reports prove Plascote No. 1 will cut booth cleaning time in half.
- It is applied quickly and easily by use of ordinary paint spray equipment, or by brushing.
- Shipped ready to apply, no pre-mixing necessary.
- Inflammable over-sprayed paints may be peeled from the spray booth walls in large sheets.
- Economical to use due to extensive coverage per gallon.

TEST SAMPLE OFFER:

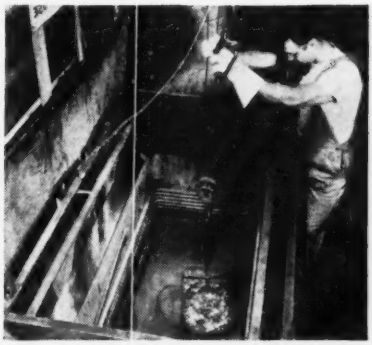
Order 5 gallons, at the drum price of $1.95 gallon.

Chemco Products Company, Inc.

7740 WEST 47TH STREET LYONS, ILLINOIS

IBM gets speedy, precision cleaning of 50,000 different parts . . . with

VAPOR DEGREASING



Courtesy: International Business Machines Corporation, Endicott, N. Y.

Fifteen years ago, the International Business Machines Corporation installed its first vapor degreasing unit in the main plant at Endicott, New York. This modern metal cleaning method, using trichlorethylene, replaced the hand wiping of flat stock and the use of the alkaline dip for the removal of oil and grease.

So successful was this first unit that, today, there are five degreasers in the Endicott plant being used for the thorough cleaning of over 50,000 different parts for the more than 1000 models of IBM business machines, time-recording units, and indicating and signaling devices.

IBM has found that vapor degreasing quickly and easily removes oil, grease and dirt from recesses and holes in even the most intricate precision parts. And the degreasers are used to handle all types of work—from tiny screws and studs to large iron castings—prior to finishing, inspection and assembly. High IBM precision standards are safely met by this precision-like cleaning method.

The excellent results experienced at the Endicott plant of IBM are being duplicated daily in thousands of plants across the country. Perhaps vapor degreasing can mean important economies in time and cost for you. Why not investigate its possibilities today?

USE DU PONT TRICHLORETHYLENE DEGREASING SOLVENT

Thousands of manufacturers are using Du Pont Trichlorethylene for vapor degreasing.

Under various trade marks, Du Pont degreasing solvents have been widely used for many years. These solvents are stable . . . the best yet developed by Du Pont for metal degreasing. They stand up against contaminating and destructive materials which may be introduced in degreasing . . . assist materially in carrying out efficient cleaning.

Tune in Du Pont "Cavalcade of America" Tuesday nights—NBC coast to coast

non-flammable DU PONT SOLVENTS for VAPOR DEGREASING

SOLD NATIONALLY THROUGH DISTRIBUTORS

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

SEND FOR HELPFUL FREE LITERATURE

These three booklets will give you detailed information on the advantages of vapor degreasing, the equipment, industrial applications, and the Du Pont degreasing solvents.

Mail the coupon today!

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept., Wilmington 98, Del.

Please send me your free literature covering the vapor degreasing process and solvents. We are interested in cleaning _____ products.

Name _____ Position _____

Firm _____

Street & No. _____

City _____ State _____

Best answer

to your finishing problems

DE VILBISS

DEVILBISS SPRAY GUNS . . .

Whether you spray lacquer, flock or adhesives . . . regardless of the shape or size of the product you're painting . . . there's *a DeVilbiss Spray Gun designed to give you finest quality finishes at low cost.*

There's the DeVilbiss MBC . . . acknowledged leader of all spray guns. No other is so widely used for so many purposes! And there are specialized DeVilbiss guns for specific jobs. Guns that handle every known type of finishing material. Suction and pressure feed guns. Guns for precise decorative work. Lightweight guns for women. Even automatic spray guns for mass production painting . . . Every one is factory-tested by experts, so it measures up to the high standard of DeVilbiss quality and efficiency. DeVilbiss Spray Guns are preferred by operators and top management alike.

So for the very best in spraying results depend on DeVilbiss. And for expert advice on all coating and finishing problems, depend on your DeVilbiss Engineer. You can consult him without obligation, of course.

THE DEVILBISS COMPANY

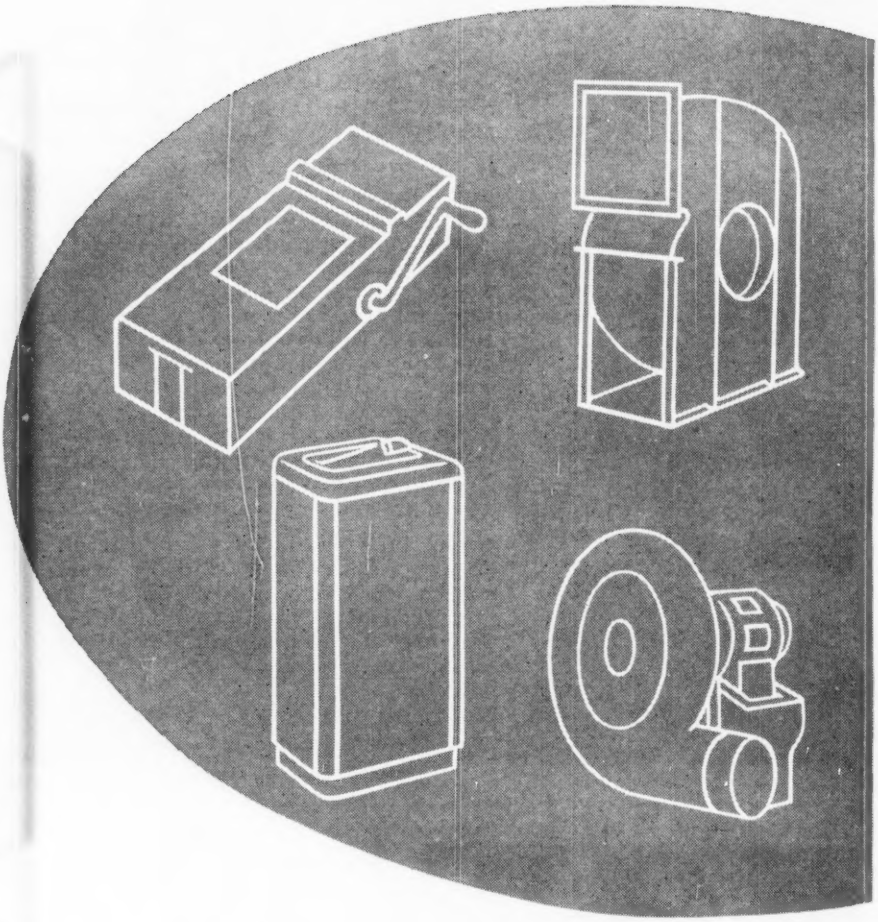
WINDSOR, ONT. • **TOLEDO 1, OHIO** • LONDON, ENGLAND

Sales Offices in 22 Leading Cities

means **Quality** *in all four . .*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

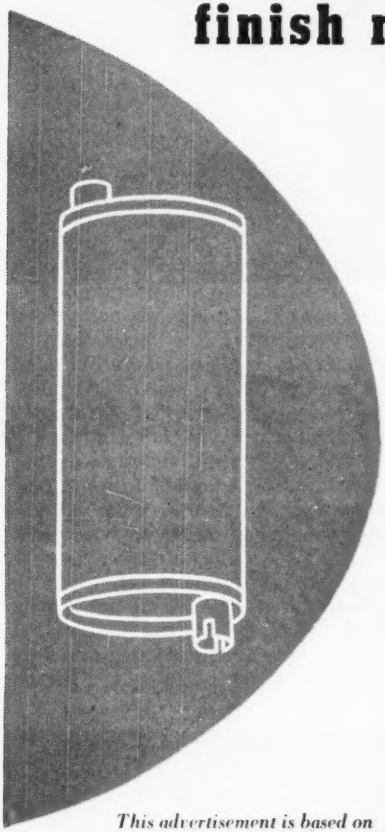
LOWE BROTHERS



✻ Finish used here was Metalustre Enamel. Manufacturers of many other sheet metal products, such as compressors, air conditioners, water coolers, registers and exhaust fans, are using Metalustre Enamel to brighten their product and keep finishing costs low. Remember, the unsurpassed quality of Lowe Brothers Industrial Finishes means unsurpassed *finishing results.*

"FINISHING SPECIALIST"

lowers manufacturer's finish needs 75% per day!



This advertisement is based on facts from the Lowe Brothers Industrial Case History Files.

"Price competition" was the major problem of this auto muffler manufacturer. When analyzing the company's finishing operation, a Lowe Brothers "Finishing Specialist" found that the method employed was responsible for unnecessary loss of material through "over-spray." He recommended better spraying methods and suggested a finish* that could take greater reduction, thus reducing material costs. These recommendations resulted in the manufacturer's needing only 10 gallons of finish per day for the same number of mufflers that had previously taken 40 gallons per day—with a corresponding savings in labor cost.

This case—where the recommendations resulted in a manufacturer's using 75% *less* finish—provides a perfect example of the way Lowe Brothers "Finishing Specialists" are serving manufacturers everywhere. You, too, may benefit by the knowledge and experience of a "Finishing Specialist." His service costs you nothing. Have him analyze *your operation* now. Write today for details.

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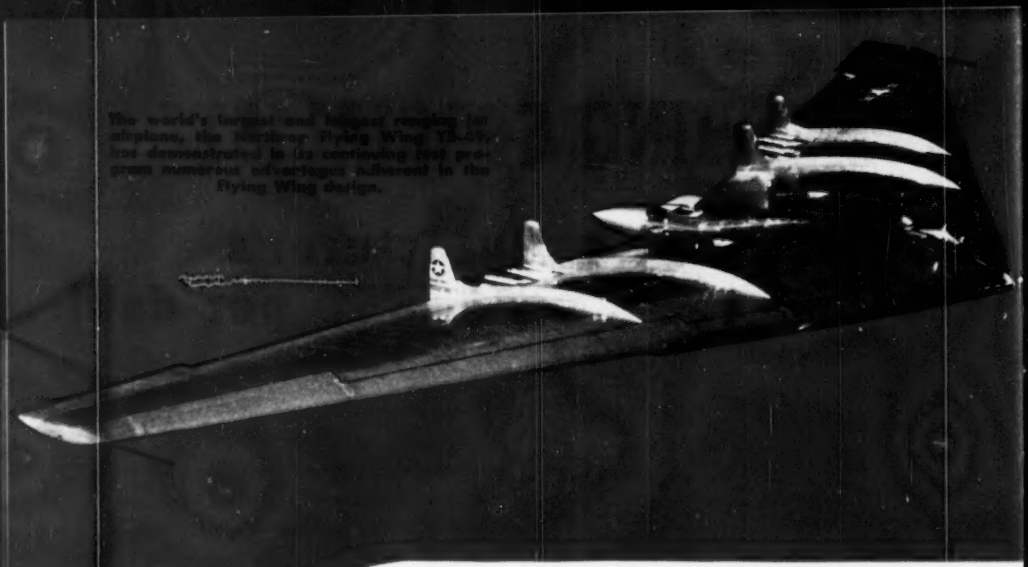


The world's largest and longest ranging jet airplane, the Northrop Flying Wing YB-49, has demonstrated in its continuing test program numerous advantages inherent in the Flying Wing design.

Aircraft Finishing Techniques Stress Utility

The Northrop X-4 high altitude research plane not only requires an ultra-smooth exterior finish to reduce air friction, but is painted white to reflect rather than absorb the hot rays of the sun encountered at high altitude.

By GILBERT C. CLOSE

METAL finishing in all its ramifications occupies a most strategic position in the aircraft industry. At least 95 per cent of all finishing operations employed from the time the raw material is received until it is incorporated into the finished airplane are strictly utilitarian in purpose. Finishing for the sake of appearance is almost nonexistent with military aircraft, and is usually limited to exterior trim and cabin decorating in commercial aircraft.

The importance of aircraft finishing is emphasized when it is remembered that all structural parts are designed to minimum strength requirements in order to save weight, and the finish is relied upon to prevent any corrosion or metal deterioration which would reduce component strength. This problem is amplified by the fact that two highly corrosive metals, aluminum and magnesium, are the basic materials of aircraft construction.

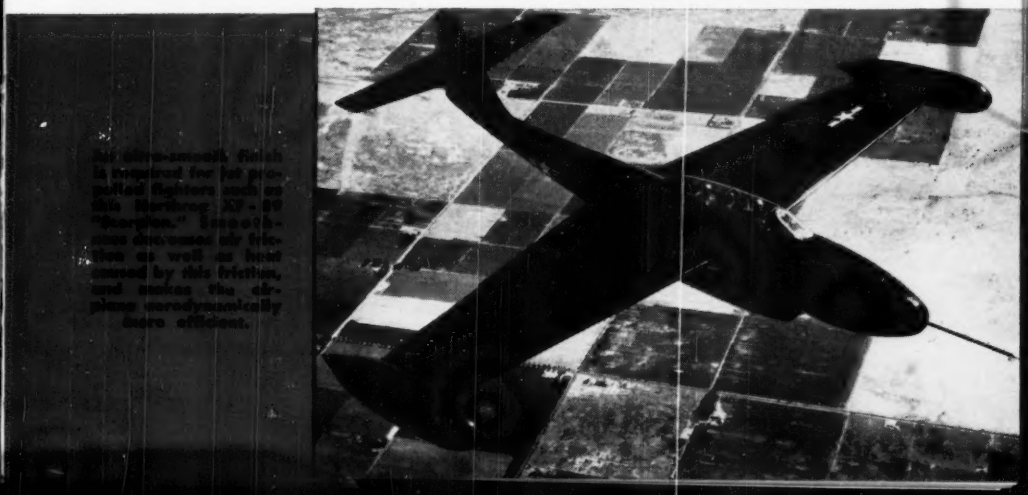
To discuss aircraft finishing it is essential to observe every process and means used to preserve metal quality and strength from its raw or "as received" condition until the airplane is obsolete or worn out. A discussion from this angle, incorporating as it does some of the most critical finishing and metal preservation problems found in industry, should be relevant to anyone faced with utility finishing.

Excellent examples of proper solutions to such problems are furnished by the practices at one specific aircraft manufacturing plant. A follow-through on Northrop Aircraft methods will offer a number of suggestions that might be incorporated into any progressive finishing setup.

Protecting Metal During Storage and Fabrication

Protection of raw stock prior to its use in production is just as important in the preservation of metal quality as is protection after the metal becomes a part of the airplane. Some stocks received at Northrop already have a protective coating—usually a film of fish oil. Uncoated stocks are given a protective coating before they are stored in bins or on pallets.

Steel stocks are given a coating of Oakite special protective oil. This substance dries tack-free, and will not pick up dust. It is easy to remove in



a degreaser, or by ordinary alkaline tank cleaning methods. Unprimed Dural and Alclad aluminum sheet stock is primed immediately upon arrival, using a Northrop-modified version of zinc chromate primer conforming to Specification AN-P-656. This modified primer with improved moisture resistance was described in the March, 1950, issue of PRODUCTS FINISHING.

Due to the length of time required to build an airplane and the intimate handling of materials and parts during production, it is often necessary to provide some sort of protection during this phase of construction. This is usually accomplished by applying a transparent strippable plastic film that prevents contamination and protects from mild abrasion.

"Kotol," a vinyl chloride transparent plastic material conforming to Specification AN-C-145, is sprayed on aluminum and magnesium sheet. This substance is used for protection both during production, and sometimes as an all-enveloping "envelope" for protection of the completed airplane until it is ready to fly. Canopies and other transparent plastic components are protected by a peel-off film conforming to Specification AN-C-154, and available from a number of commercial concerns. This film prevents abrasion and minor surface scratches that would quickly impair the optical qualities of the acrylic enclosures.

Another peel-off hot dip type plastic film conforming to Specification AN-C-117 is used for the protection of machined parts until they are installed in the airplane.

Finishes and Finishing Processes

All steel to be welded is cleaned first by degreasing in a trichlorethylene degreaser, then by immersion in a Turco alkaline bath. Following welding, the components are sandblasted and then cadmium plated. When the condition of the welded part warrants it, the part is descaled electrolytically prior to plating. The interior of welded steel tubing

Fig. 1—Exterior airplane finishes must be able to "take it on the chin." Note the cloud of dust lashed back against the fuselage by the spinning propeller. Though this Northrop utility airplane is not painted externally, the metal used on all exterior surfaces was surface treated chemically during production.

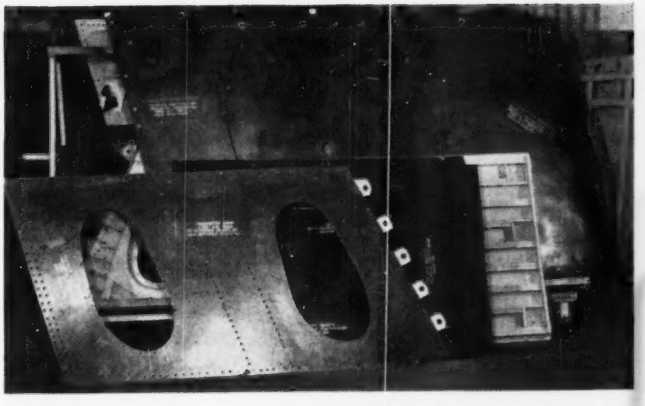


Fig. 2—These parts, in the process of production, have been completely "enveloped" in a peel-off type plastic film. The film prevents corrosion and protects from minor abrasion.

is protected by flushing it with Paralketone, a substance conforming to Specification AN-C-52. In welded tubing closed on both ends, small holes are drilled in each end and the Paralketone is forced in under pressure.

Parts fabricated from aluminum are cleaned in a mild alkaline cleaner. Subsequently all Alclad sheet stock parts are chromatized. The chromatizing treatment is used on aluminum parts to form thin, inert surface oxide chromate-containing films which serve to promote paint adhesion. The process (after a mild alkaline cleaning and cold water rinse) is as follows:

1. Dip for 3 to 5 minutes in a 5 to 10 per cent chromic acid solution, held at 150 deg. F.
2. Rinse in cold water.
3. Dry.

Dural sheet and extrusions of the various alloys are anodized in a chromic acid anodic bath. A typical chromic acid anodizing process cycle, used to produce the protective surface coating of aluminum oxide, is as follows:

1. Clean in a hot, mild alkaline cleaner.
2. Rinse in cold, running water.
3. Using a reverse current, at a current density of 1 to 5 amp./sq. ft. and a voltage of 40 volts, anodize in 5-10 per cent chromic acid, held at 95 deg. F., for 30 minutes.
4. Rinse in cold water.
5. Seal for 30 minutes in hot water at 200 deg. F. (preferably deionized water, aluminum tank).
6. Rinse in hot water and dry.

The oxide coating formed is about 0.00005 inch thick. This process is particularly adapted to the protection of assemblies, since the corrosion resistance of the aluminum surface is not impaired by any chromic acid that may be trapped in joints or crevices.

Magnesium parts, after fabrication, are degreased in a trichlorethylene degreaser, then pre-treated in a bath composed of 10 per cent nitric and 10-20 per cent sulfuric acid. They are then given a normal acid dichromate (Dow No. 7) surface treatment. A coating consisting essentially of magnesium oxide, chromate, and dichromate, and chromium chromate and dichromate is produced by the following procedure:

1. Clean work by alkaline cleaning, which is preceded by vapor degreasing if required.
2. Rinse in cold water.
3. Immerse work for 5 minutes in a water solution containing 15-20 per cent (by weight) hydrofluoric acid at room temperature.
4. Rinse in cold water.
5. Immerse in a boiling solution of sodium dichromate (10-15 per cent by weight) for 45 minutes.

6. Rinse in cold water, then in hot water to facilitate drying.

Note: The hydrofluoric acid bath should not be permitted to fall below a concentration of 10 per cent HF. The sodium dichromate solution should be held to a pH of 4.2 to 5.5.

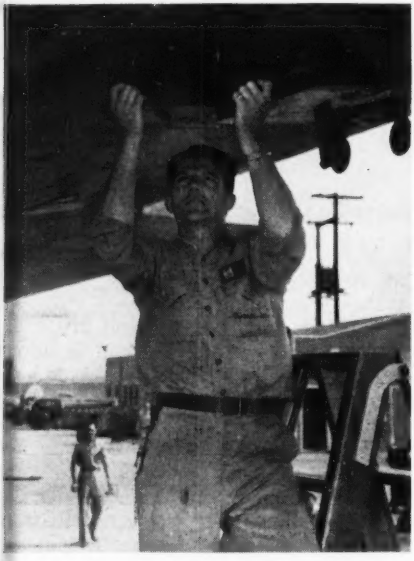


Fig. 3—Here a workman is peeling the plastic film from the underside of the giant Northrop "Flying Wing." The film is easy to remove and can be torn away in large sections.

When finished magnesium components are too large for immersion in the regular surface treating tanks, they are flushed with a 3 to 5 per cent solution of hydrofluoric acid. Special precautions for personnel safety must be observed when this process is used.

Following surface treatment, all magnesium components are given two coats of the Northrop-modified zinc chromate primer, followed by one coat of gray enamel conforming to Specification AN-E-7. Time is of the essence in the protection of magnesium. All parts are treated and coated immediately after fabrication to prevent surface corrosion of the raw metal surfaces.

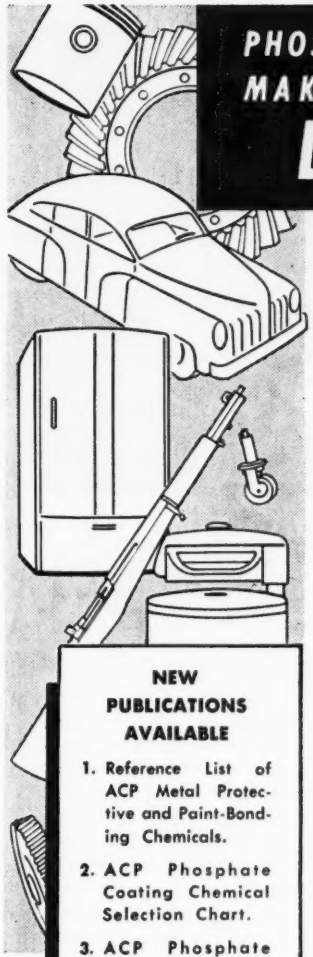
One problem which always rears its ugly head in aircraft production is the danger of bi-metal corrosion. Dissimilar metal contacts in an airframe constructed of intermingled steel, aluminum and magnesium components are numerous, and the active nature of these metals amplifies the danger of electrolytic corrosion at the contact points. When joints are made by drilling bolt or rivet holes, the value of prior protective coatings in joint insulation is destroyed.

To offset this danger, zinc chromate paste is applied to both faying surfaces when dissimilar metals are joined. When magnesium is involved in the assembly, 56S rivets containing 46 per cent magnesium alloy are used. This pertains to blind and cherry rivets, as well as the driven type. All steel bolts are cadmium plated prior to installation, then given added insulation in the form of a zinc chromate coating.

The increasing use of glass cloth laminates in aircraft construction for both structural and non-structural components has resulted in extensive study relative to smoothing, final finishing and protection of these surfaces.

At Northrop Aircraft, all laminate surfaces are first coated with a primer-surfacer to reduce natural roughness. Rex-118 Primer-Surfacer has been found very satisfactory. After the surfacer has dried, it is sanded smooth and, on exteriors, painted to match surrounding areas. Gaco Neoprene cement is used to coat laminates where protection from rain erosion is required. This is a necessary precaution when the laminates are used for wing and airfoil leading edges, or for fuselage skins in areas subjected to rain drop impact.

The final or exterior finish of an airplane depends to a large extent upon its subsequent use. Most commercial aircraft with metal skins are left unpainted except for trim strips and upper nose section (to reduce glare for



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the pilot). Some military aircraft, especially those of the combat type, are given camouflage coatings. But regardless of any spectral or decorative effects desired, increasing speeds with the concurrent problems of increasing air friction demand an exterior finish that is highly efficient aerodynamically. This calls for ultra-smoothness and the elimination of slight surface irregularities that will interfere with a smooth airflow. These irregularities may be actual dents in the metal (sometimes called "oil cans") or even slight depressions caused by the heads of tightly driven rivets. At the same time, the heat caused by air friction in high speed jet propelled airplanes demands of the finish a high degree of heat resistance.

In getting this smooth overall finish, the usual practice is to disregard minor blemishes and let a coating of primer-surfacer fill them in as it is applied. Major dents and blemishes are filled in individually with PX 4045 airfoil putty prior to application of the Rex-118 Primer-Surfacer. The number of coats of primer-surfacer, with sanding between each coat, depends upon the roughness of the surface and the degree of smoothness required. As many as 16 separate coatings of this material have been applied to secure the ultra-smoothness required in certain high-speed jet and rocket airplanes.

Only the highlights of aircraft finishing can be touched in an article of this type, but even these highlights offer a wide variety of suggestion in methods of improving utility finishing. All engineers recognize the fact that every process which tends to preserve and maintain product quality is an inherent part of industrial finishing technique.

Fig. 4—Not a heavy field gun—just two of the four huge jet tubes found in each wing of the Northrop "Flying Wing." The workman is polishing and smoothing, a constant occupation necessary to keep airplane exterior finishes in tip-top condition.
(All photos courtesy of Northrop Aircraft, Inc.)

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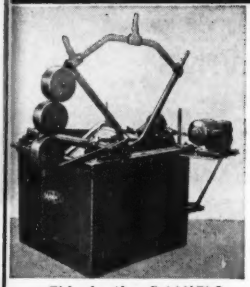

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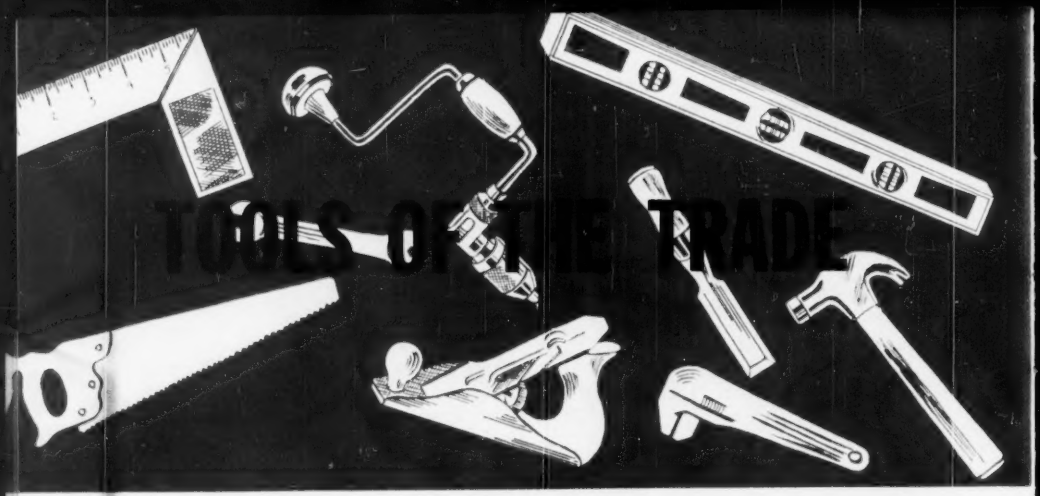


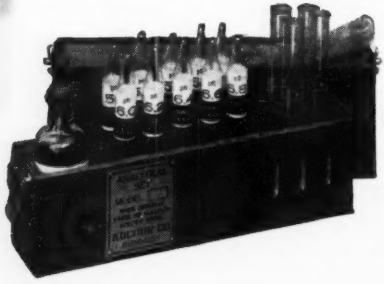
Uniform electroplated coatings of high quality can be obtained only under carefully controlled conditions. While a great part of plating solution analysis is usually performed by chemical laboratory methods, there have been developed a number of mechanical or electrical "tools" to assist the plater, chemist, or metallurgist in his task of analyzing plating solutions and testing the thickness, corrosion resistance, or abrasion resistance of the plate. Some of these testing devices are described briefly in this article.

—Editor

pH Measurement

KOCOUR COMPARATOR

THE importance of pH measurement and control in electroplating operations is generally accepted, particularly with reference to bright nickel plating solutions. pH may be measured colorimetrically or electrometrically. One of the methods of measuring pH colorimetrically is through the use of the Kocour Comparator, product of the Kocour Co., 4800 S. St. Louis Ave., Chicago 32, Ill. This set, available in several pH ranges for application to different plating solutions, consists of a number of color samples corresponding to various pH readings, and the corresponding indicator to be used in making the test. In testing the pH of his plating solution, the plater or chemist merely adds the specified amount of indicator to the correct amount of plating solution and compares the color obtained with that of a standard color. Standards are



Kocour Comparator

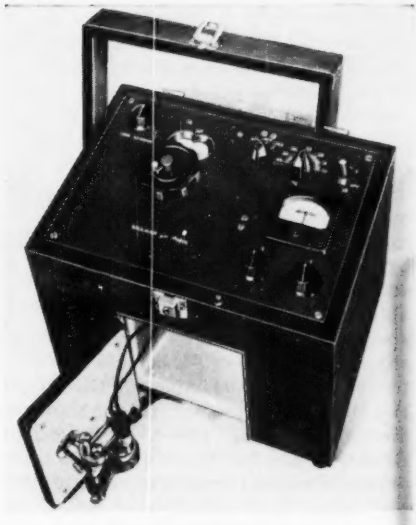
shifted until the color of the sample agrees closely with the color of one of the standards. At this point the pH of the solution being tested is the same as that of the standard with which color agreement was obtained.

BECKMAN MODEL H-2 pH METER

One device for measuring pH electrometrically is the Beckman Model H-2 pH Meter, manufactured by National Technical Laboratories, 820 Mission St., South Pasadena 9, Calif. This portable glass-electrode pH meter, which is designed to operate on standard 110-volt, 50-60 cycle, alternating current, can be moved to various locations, or installed permanently.

The Model H-2 covers the full scale of 0 to 14 pH and can also be used for making millivolt readings from 0 to 1400 m.v. for titrations and oxidation-reduction measurements. Measurements of pH can be made to an accuracy of 0.03 pH unit and millivolt reading to 2 millivolts. A neutral position on the switch disconnects the indicating meter from the electrical circuit to avoid excessive swinging of the meter needle during warm-up periods and when changing test samples or electrodes. Standardization with one buffer provides for accurate measurements over the full range of the instrument, thus eliminating cross checking between two buffers. The instrument may be checked and corrected for drift at any time by simply pressing a button on the electrode terminal and bringing the needle to the pointer position with the standardization control.

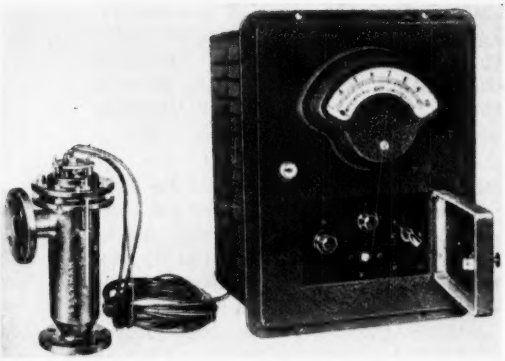
Beckman Model H-2 pH Meter



Beckman Model G pH Meter

The Model H-2 features a built-in temperature compensator dial, calibrated from 0 to 100 deg. C., which can be set at the temperature of the test sample, thus automatically adjusting the measuring current to compensate for the effect of temperature on the EMF of the glass electrode and thereby ensuring correct pH reading without calculations or reference to pH temperature charts. The Model H-2 is supplied equipped with a calomel electrode and patented internally-shielded

Beckman Model R Automatic pH Indicator



Beckman glass electrode with integrally-attached shielded lead to eliminate electrostatic interference. The glass electrode is permantly sealed and has a virtually unbreakable immersion end made of special glass. Various types, shapes, and sizes of glass electrodes are also available for the Model H-2 to meet various operating requirements, including the new Beckman Amber Glass Electrode for high temperature measurements over the entire pH range, with practically negligible error even at 14 pH.

BECKMAN MODEL G pH METER

Also available is the Beckman Model G pH Meter, designed for measurements of the utmost accuracy, and battery-operated so that it can be used for taking pH measurements at any point in a plant.

BECKMAN MODEL R AUTOMATIC pH INDICATOR

The Beckman Model R pH Automatic Indicator may be installed for automatic pH measurement and control. For this purpose it is operated with a recorder or recorder-controller, thus providing automatic process control of pH in the plating plant.

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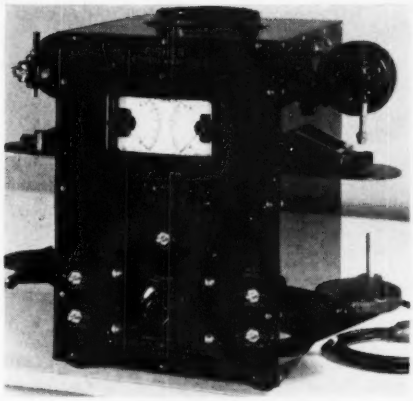
Solution Analysis

FISHER ELECTRO ANALYZER

Although much of the work of determining the chemical composition of plating solutions is performed by chemical analytical methods, one simple and convenient way to analyze for the major metallic ingredients is to deposit the metal in question (contained in a small sample of solution) on a weighed platinum gauze or coil electrode. From the gain in weight of the electrode, the amount of the metal in solution can be readily calculated.

One device which may be used for this purpose is the Fisher Electro Analyzer, product of the Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa. The Electro Analyzer is an up-to-date instrument that facilitates the rapid quantitative determination of such metals as gold, silver, platinum, cadmium, zinc, lead, nickel, copper, and tin from their respective solutions.

This testing device is a two-place instrument, permitting simultaneous analysis of similar samples or the use of



Fisher Electro Analyzer

entirely different systems in the two places. It operates directly from a 110-volt, 60-cycle, single-phase circuit. At each side of the case is mounted a motor to which stirring electrodes or glass stirrers can be attached. Immediately below each motor is a rubber-coated platform that is pivoted and can be swung out of the way when the solution beaker is to be placed in or removed from position. Binding posts to accommodate the electrode leads are mounted on a Bakelite shelf just below the motors. The convenient assembly of the electrode system facilitates their use and adds to the versatility of the instrument.

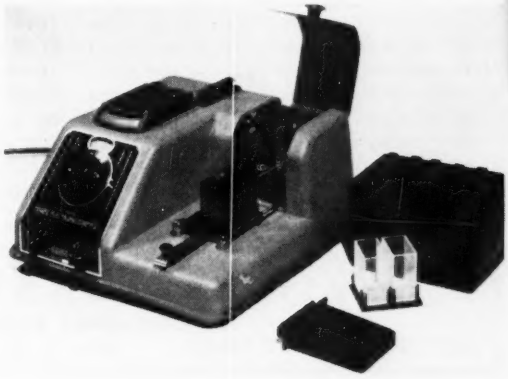
On the panel are located "on-off" switches to operate separately the two stirring motors and the current input, as well as a d.c. ammeter, a d.c. voltmeter, and a dial to control the current input to the electrodes.

Inputs from zero to 36 watts can be obtained (or a maximum of 6 volts and 6 amperes). This provides an ample range so that the optimum current for every separation is available. This optimum is different for each type of analysis and varies with the nature, concentration, temperature, and degree of agitation of the solution. It also varies with the nature, area, and distance between the electrodes.

FISHER ELECTROPHOTOMETER

Small amounts of such plating bath ingredients as addition agents in bright nickel solutions are difficult to determine by the usual laboratory methods. Such determinations can be made accurately, quickly, and easily by color comparison with a standard sample using a colorimeter, such as the Fisher Electrophotometer.

The Electrophotometer, product of the Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa., is an improved instrument that operates from any 110-volt, 50-60 cycle, current source. It enables the user to detect very slight color intensity differences between color standards containing specified amounts of the ingredient in question and the sample being tested, because the photoelectric system it employs is considerably more sensitive than the human eye. The Electrophotometer is



Fisher Electrophotometer

Beckman Model B Spectrophotometer

essentially a color comparator in which a photoelectric system has been substituted for visual observation. The instrument is quickly standardized, and the actual determination requires less than a minute.

In addition to its use for analysis and control of addition agents for bright nickel solutions, the Electrophotometer may be used to determine traces of nickel, lead, chromium, copper, manganese, magnesium, aluminum, and iron in various plating baths in which the presence of these elements is objectionable.

BECKMAN MODEL B SPECTROPHOTOMETER

In the operation of today's high-speed plating solutions the problem of determination and removal of small amounts of objectionable impurities has become increasingly important. An analytical instrument used for quick, accurate determinations of impurities in various plating baths is the Beckman Model B Spectrophotometer. This device can be used to determine impurities of chromium, copper, iron, zinc, aluminum, and other materials in bright nickel solutions, for example, so that necessary steps can be initiated to remove the objectionable material and ensure a high quality deposit.

The Model B Spectrophotometer combines advantages of high resolution, wave length and photometric accuracy, freedom from stray light, and wide spectral range. Its features include direct reading absorbence and transmittance scales, interchangeable phototubes for wider wave-length range, four-position cell carriage for more rapid readings, and design and construction ensuring accuracy and versatility.

LEITZ INDUSTRIAL ROUY-PHOTROMETER

Designed to speed routine processing analyses of electroplating solutions and a wide variety of other materials, the Leitz Industrial Rouy-Photrometer provides great accuracy in colorimetric absorption analysis. This improved type of photoelectric colorimeter, made by E. Leitz, Inc., 304 Hudson St., New York 13, N. Y., gives concentration readings in which inherent functional error is cut to within 0.1 per cent. Such accuracy is made possible by careful matching of the photoelectric cell and the microammeter.

Operation of the Rouy-Photrometer is rapid and simple, with a single con-

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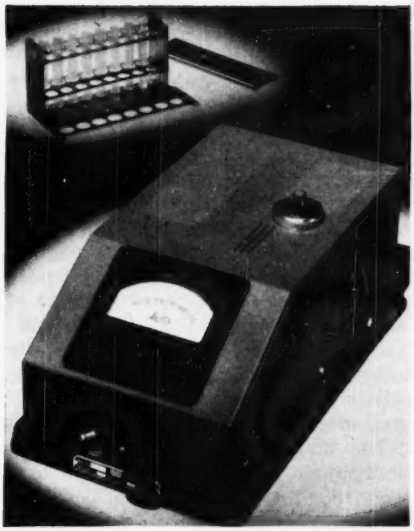


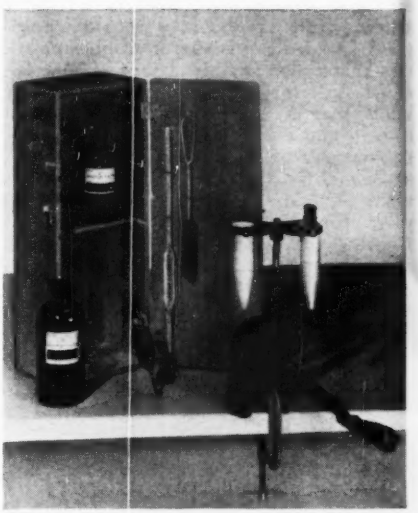
Leitz Industrial Rouy-Photrometer

trol for all adjustments. Once calibrations have been set up, no special skill or calculation is required of the operator, and routine colorimetric analyses can be made in the following three steps: (1) place an absorption cell containing a solution of zero concentration in the Photrometer and set needle to 100; (2) remove the absorption cell and replace with a cell containing the unknown. Note the reading; (3) refer to calibration table which indicates concentration of the unknown, for the particular reading.

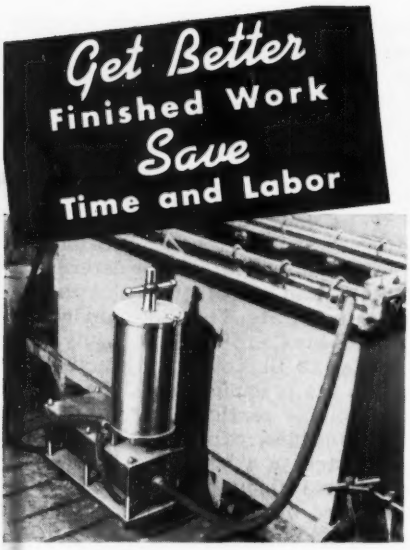
Maximum reproducibility, so important in efficient process control, is assured for identical readings on the same specimen and can be obtained by different workers, even on different Photrometers.

KOCOUR SULFATE TEST SET

The analysis of chromium plating solutions consists generally of the determination of chromic acid, sulfate, and sulfate ratio. Probably in no other electroplating solution is there a single factor as important as the sulfate ratio in chromium plating solutions, since the value of this factor has such a marked influence upon throwing power and appearance of the chromium plate. The chromic acid content may be determined by chemical analysis or with a Baume' hydrometer. The sulfate content may be determined rapidly and satisfactorily with the Kocour Sulfate Test Set, product of the Kocour Co., 4800 S. St. Louis Ave., Chicago 32, Ill. This testing method involves the precipitation of the sulfate as insoluble particles and the centrifuging of these particles into the graduated stem of a centrifuge tube where the actual amount of sulfate may be measured by means of the graduated markings on the glass stem. The centrifuge tubes are graduated to read directly in oz./gal. of sulfate to the nearest 0.02 ounce. The test requires about seven minutes under normal conditions.



Kocour Sulfate Test Set



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Solution Control

There are three methods for maintaining and controlling plating baths to keep them in good operating condition. These are: (1) observation of deposits with adjustments based upon experience; (2) chemical analysis together with physical tests of sample deposits; and (3) plating tests of the baths under controlled conditions. The first method is obviously approximate but should not be underestimated in importance. This method also includes frequent checking of mechanical details, such as in automatic plating machines. The second method is important wherever applicable and is essential to successful plating bath operation.

Plating tests afford the only means for control of many of the factors that enter into bath maintenance, supplementing both judgment and chemical or physical tests. These factors are mostly organic addition agents, decomposition products, bath impurities, both organic and inorganic, and optimum operating conditions such as bath composition, pH, temperature and current density. Several methods for conducting plating tests have been proposed, including the bent cathode test, the slot-type plating cell test, and the Hull Cell Test.

HULL CELL TEST

The Hull Cell Test Unit, supplied by R. O. Hull & Co., Inc., 1273 W. Third St., Cleveland 13, Ohio, includes a clear plastic miniature plating cell complete with rectifier power source, ammeter, voltmeter, and rheostat. Either a 1000 cc. or 267 cc. plastic cell is available, as well as power sources providing 5 amperes or 30 amperes maximum current. Cathodes of the correct size for use with the equipment, fabricated from various metals, are also available. The test set may be employed for control of chromium, bright nickel, zinc, cad-

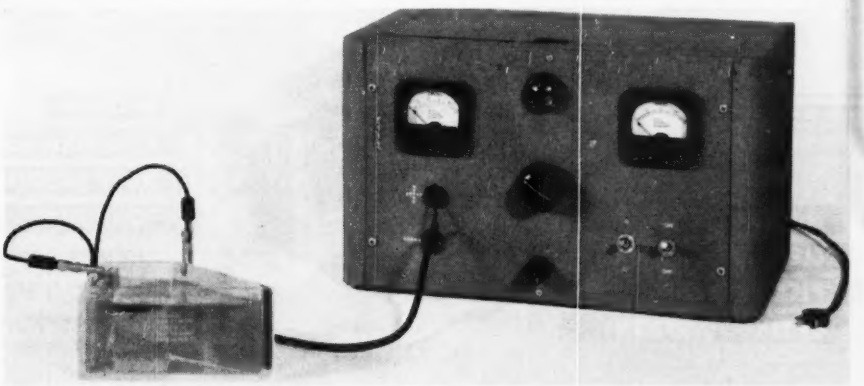
mium, brass, copper, and silver plating solutions.

The function of the Hull Cell is to provide by geometric configuration a cathode deposit that records reproducibly the character of electroplate produced at all current densities within the operating range. By measurement of the distance of the bright plating range from the end of the cathode, the limiting current densities can be derived from a curve in which the current density range covered with a 3-ampere test panel is about 6 to 120 amp./sq. ft. A simple explanation of the wide variation in current density obtained under these conditions is that the current through the bath must pass through a constantly diminishing cross-sectional area of the solution so that the resistance to current passage increases as it approaches the end of the cathode farthest from the anode, and hence the current decreases rapidly toward that point.

The Hull Cell test unit finds an ideal application in the rapid duplication of conditions experienced in production in large plating installations. Small quantities of the plating solution in question may be treated various ways, additions made, or chemical composition corrected. Sample panels plated in the Hull Cell will reveal the correctness of the operations performed. The control chemist is thus able to determine what changes need to be made in the production solution by observing the results obtained in Hull Cell tests on a small quantity of solution. Production difficulties can thus be corrected promptly and accurately without interrupting normal plating unit operations.

Each type of bath shows different effects in plating tests because no two kinds of baths operate exactly alike. Thus, a bright nickel bath should show a bright range over the entire panel, whereas most cyanide baths require a good plating range of about two-thirds of the panel, and barrel baths require only the lower one-third of the panel to operate properly. Obviously, the operator should make a number of panels to observe the effect of each bath addition upon the panel.

With experience gained by Hull Cell tests, it is possible to limit lengthy chemical analyses to a minimum and even eliminate some of them. The Cell also serves as a research tool for quickly evaluating new addition agents for plating baths, and it is on this basis that many of the processes now available have been developed. Plating tests do not provide the answer to all plating



Hull Cell Test Unit Model B-267

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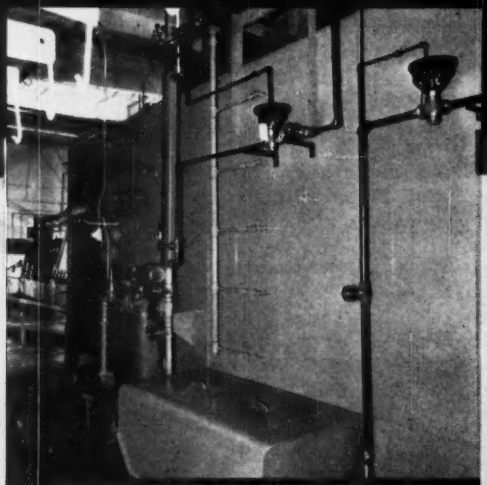

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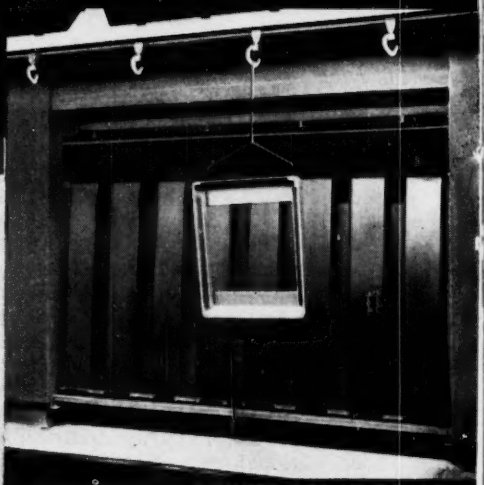

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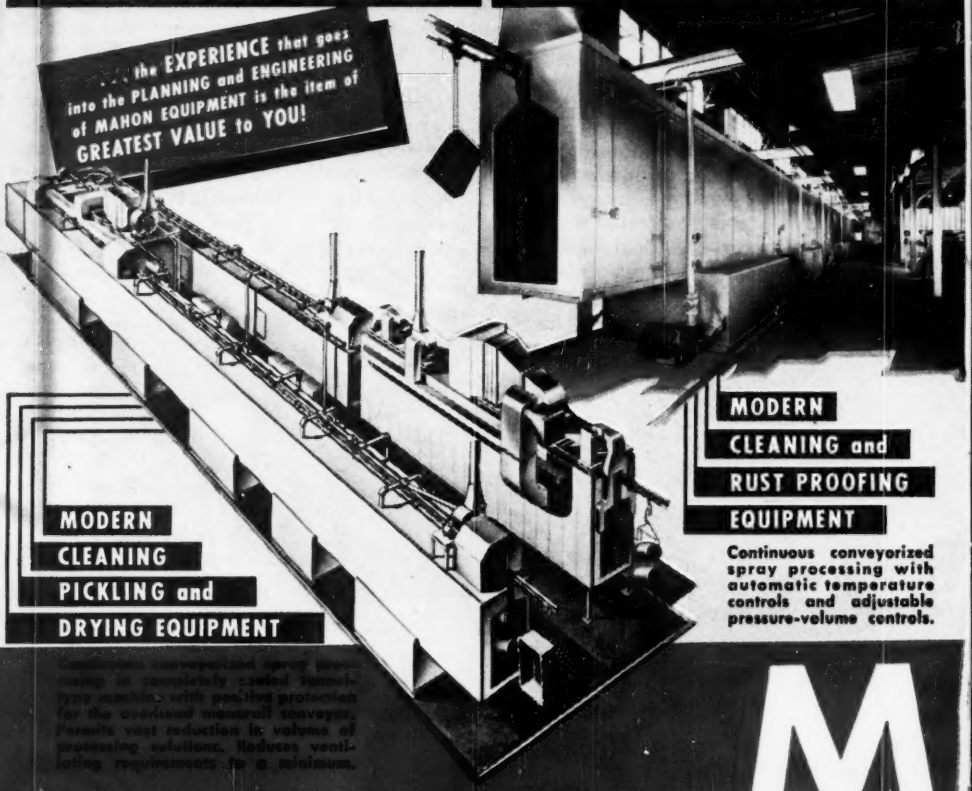

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problems, but have definite limitations with respect to mechanical deficiencies in a plating cycle which influence the behavior of a plating bath. A good example of this is in full automatic chromium plating baths in which stray currents cause "rainbows" on some areas of the work which, when subsequently plated in the same tank give a smear or white-washed appearance. Such cases require a higher than normal sulfate content, even at the expense of the widest plating range and best throwing power.

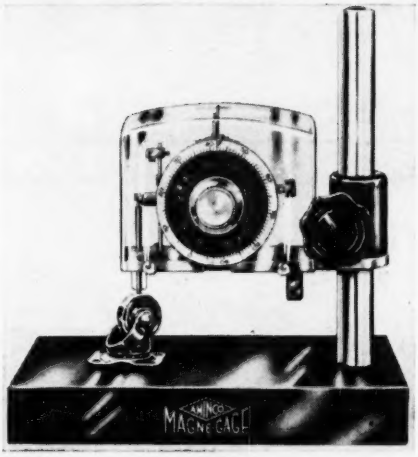
The complexities in plating are so many that each type of bath control must be considered as only a part of the problem of securing perfect work with the minimum of rejects, and regular plating tests occupy an important spot in the whole picture.

Measuring Deposit Thickness

Inasmuch as most specifications for plated finishes require certain minimum deposit thicknesses, the measurement of the thickness of the plate is of primary importance in any consideration of tests made on plated products. A number of methods of testing thickness have been developed and used over the past several years, but considerable interest has been centered in the magnetic method of testing plate thickness since this testing method does not destroy the plated product.

AMINCO-BRENNER MAGNE-GAGE

One device used to test plating thickness is the Aminco-Brenner Magne-Gage supplied by the American Instrument Co., Inc., 8030 Georgia Ave., Silver Spring, Md. The Magne-Gage may



Aminco-Brenner Standard Magne-Gage

be used to measure the thickness of a non-magnetic material when it is applied over iron or steel, and nickel plating applied over a non-magnetic material. The Magne-Gage is self-contained; no electrical power or auxiliary equipment is required. It may be used in laboratory or plant testing of plate thickness.

The operation of the Magne-Gage is based on the magnetic attraction of a small permanent magnet to the material being measured and/or the backing or base to which the material has been applied. The permanent magnet is suspended freely from a horizontal lever which is actuated by a spiral spring. The spring is wound by rotating a graduated dial until the permanent magnet separates from the specimen. The Magne-Gage dial reading taken at this point, when referred to a calibrated curve, provides an accu-

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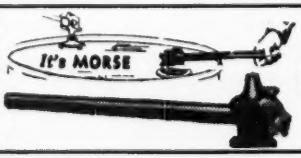

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rate measurement of plating thickness. Four different magnets and seven different calibration curves can be used in testing deposits involving different base metals and thickness ranges.

As a result of recent research work at the National Bureau of Standards, the Magne-Gage may now be modified by the use of two magnets of different strengths to obtain the total thickness of a composite coating of copper and nickel, and also the relative thicknesses of the copper and nickel layers.

The Magne-Gage can be used to measure coatings on convex, concave, and plain surfaces provided that the radius of curvature of the surface is not too small and provided the gage is used with its magnet in the normal vertical position. For example, the instrument will measure coatings on cylinders larger than ¼ inch, and on spheres larger than ¾ inch in diameter without need of a correction factor.

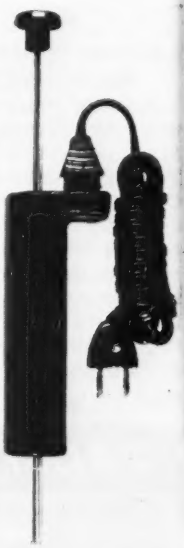
In measuring nickel coatings on nonmagnetic base metals, the instrument should be used not closer than 0.15 inch to an edge, and for other applications not closer than 0.08 inch. Measurements should not be made on flat pieces less than ¾ inch square for base metal thickness less than 1/32 inch. For lesser base metal thickness the pieces should be at least 3 inches wide unless a special calibration has been made for such pieces.

EXTENDED ARM MAGNE-GAGE
EXTENSIBLE MAGNE-GAGE
EXTENDED GUARD MAGNE-GAGE

Also available are special models of the Magne-Gage designed to accomplish thickness measurements under special conditions. These models include the Extended Arm Magne-Gage designed for measuring coating thickness on inside surfaces of objects with openings not less than 1 inch square or 1 inch in diameter; the Extensible Magne-Gage used for measuring coating thickness on the inside walls of tubes, pipes, gun barrels, cylinders, and other hollow bodies; the Extended Guard Magne-Gage which is particularly suited for measuring coating thickness where the surface to be measured cannot be placed in contact with the magnet of a standard Magne-Gage. Instruments are also available for measuring the thickness of nickel coatings up to a thickness of 0.0045 inch through the employment of the different magnets and calibration curves previously mentioned.

LEA LECTROMAG

The Lea Lectromag (Lipson Patent Pending), an instrument for measuring the thickness of non-magnetic coatings on iron or carbon steel by magnetic means, is available from the Lea Manufacturing Co., Waterbury, Conn. This device is a simple, durable instrument designed to measure coatings from 0.0002 to 0.008 inch with a plus or minus 10 per cent accuracy for thicknesses of 0.001 inch. Its small size, compactness, and portability make it useful in plants where it is advantageous to check plating thickness on parts in process in various areas in the plant. With this instrument thickness measurements can be made wherever there is an available 110-volt power outlet.

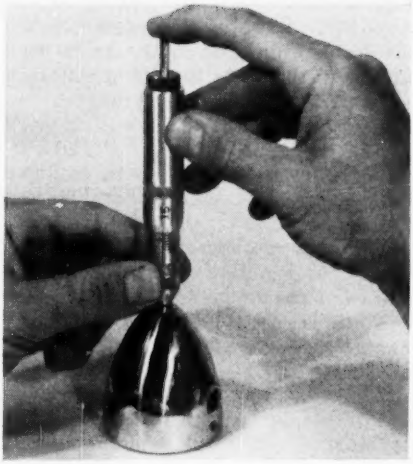


Lea Lectromag

To make a thickness measurement the instrument leads are plugged into a source of 110-volt 60-cycle power and the instrument is held vertically over the part on which the thickness is to be tested, allowing the glass tube with its core to rest on the surface. Holding the glass tube in contact with the surface, the solenoid is raised slowly until a warning signal or chattering noise is heard. This signal indicates that the core is about to break its contact with the plated surface. After the core breaks the contact, it is allowed to come to rest, after which a direct reading may be taken. It is suggested that several readings be made so that an average result may be calculated. A calibrated scale makes possible the translation of readings directly into coating thicknesses.

KROUSE MAGNIFYING MICROMETER

Another magnetic thickness measuring device is the Krouse Magnifying Micrometer, available from the Krouse Testing Machine Co., 573 E. 11th Ave., Columbus 3, Ohio. The Magnifying Micrometer measures the force necessary to overcome the magnetic attraction between the permanent magnet in the instrument and the magnetic base material, the magnetic coating, or the combination of the two. To measure the thickness of a magnetic coating, such as nickel plate, the Magnifying



Krouse Magnifying Micrometer in use

Micrometer is placed against the surface to be measured and held in a vertical position. The micrometer thimble is rotated, changing the tension on the precision spring. When this tension is greater than the force holding the magnet to the surface being tested, the magnet will suddenly separate from that surface, moving the indicator rod extending above the top of the tool, thus providing a very definite end point indication. It is recommended that several readings be taken and the average micrometer value used on the taper gage.

The **Krouse Precision Gage,** used in conjunction with the Magnifying Micrometer, has a uniform taper throughout its gaging length. The micrometer is turned to the average reading and the magnet is set near the thinnest plated end of the gage, and the unit is then slid up the taper. When the magnet releases (as previously described), the indicated thickness is read directly from the gage graduations. The reading may be checked by resetting the magnet to a point above the indicated thickness and approaching by successive steps the point at which the mag-

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net just holds.

Various thickness gages prepared for varying thickness ranges, as well as for checking nickel over steel and nickel over brass, are available for use with the magnifying micrometer. Both magnetic coatings on a magnetic steel base and magnetic coatings on non-magnetic bases may be measured with the device. The micrometer may also be used on sloping, vertical, or overhead surfaces if the gage is used at about the same inclination as the surface being measured. Where only a small magnetic attraction is present, as is the case in nickel plate on a non-magnetic base, the instrument must be used in the vertical position only.

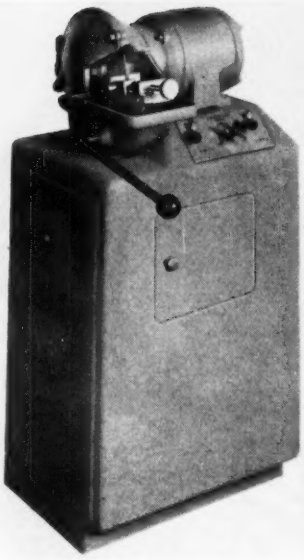
MICROSCOPIC EXAMINATION

A method of electroplate thickness measurement which finds application where it is not objectionable to destroy the sample being inspected is that of preparing a cross-section of the sample at the point where measurement is desired, polishing the mounted specimen and observing and measuring the thickness of the plated coating by means of a metallurgical microscope.

A number of machines used in sample preparation and thickness measurement are described here.

1010 AB CUT-OFF MACHINE

To obtain a sample for microscopic examination or the measurement of plating thickness it is usually necessary to cut the sample from a finished or semi-finished part. A quick, easy and safe way to accomplish this is with an abrasive cut-off machine. The 1010 AB Cut-off Machine, product of Buehler, Ltd., 165 W. Wacker Dr., Chicago 1, Ill., is designed specifically for metallurgical laboratory use. A thin abrasive disc measuring 9 inches in diameter and $\frac{1}{16}$ inch thick is driven by a 1 h.p. motor. The part to be cut is held in a vise attached to the cutting table. The specimen is fed into the



1010 AB Cut-off Machine

rotating cut-off wheel by raising the large lever with ball handle. A tank and pump, built into the base on the machine, supplies a source of cooling liquid to the abrasive wheel to prevent overheating of the sample during cutting. Temperatures must be kept down during cutting, or any other phase of sample preparation, to prevent change of crystal structure. This is especially true of hardened steels. A mixture of water and soluble oil is used for cooling and for rust prevention.

The cutter shown has all controls in a panel on the front of the machine. The compartment in the front is provided for extra cut-off wheels and tools. The wheels are easily changed or replaced by opening the hinged wheel guard.

1251 AB DUO-BELT WET SURFACER
1212 AB WET POWER GRINDER

A sample which has been cut off in the abrasive cutter can be mounted

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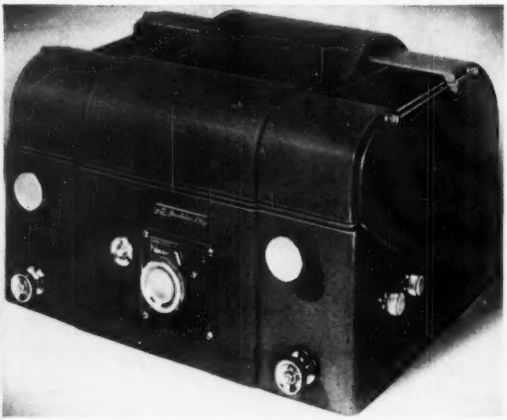


1251 AB Duo-Belt Wet Surfacer

immediately without grinding. However, samples which have been cut with a hack saw, band saw, shears or other methods must be ground flat before mounting. A sample which has been flame cut must be further cut or ground until all of the metal which has been heated has been removed. In a case like this, a considerable amount of metal must be removed.

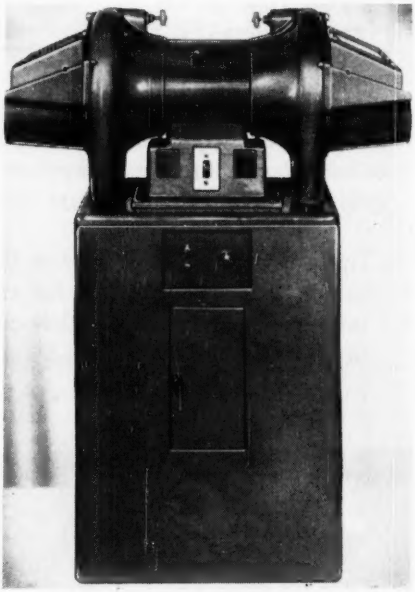
For this purpose a heavy duty wet grinder is required. Two different types are illustrated. The 1251 AB Duo-Belt Wet Surfacer, product of Buehler Ltd., is a very convenient apparatus for this purpose. The streamlined housing covers a heavy duty motor. To each end of the machine is attached a pulley which drives an abrasive belt. Two-speed control is provided by the switch at the front of the machine. Controls at the front also provide coolant for either or both of the belts. The belts may be replaced by removing the side panels. All controls for tightening and centering the belts are located on the outside of the machine. A large flat grinding area of 4 x 6 inches is provided on each belt to accommodate oversize specimens.

The 1212 AB Wet Power Grinder has a 12-inch diameter grinding wheel on each end of the motor shaft. The steel backed wheels are balanced for vibration-free operation. The coarse wheel is used for roughing; the fine wheel provides a smooth surface for further preparation. The coolant is also supplied in this model by a self-contained tank and pump. Extra large guards are provided with safety windows and lights for perfect visibility.

1315 AB SPECIMEN MOUNT PRESS

Samples of plated products, ground smooth, are mounted for polishing in a Specimen Mount Press.

Samples are mounted in hard plastic before polishing because the polishing



1212 AB Wet Power Grinder

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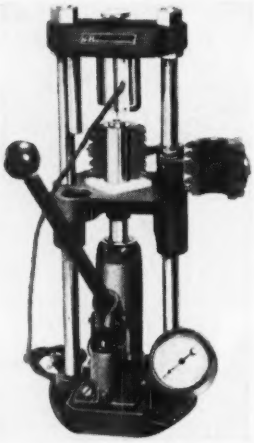
operation tends to round off the edges of the metal making the observation of the edge of the sample



1315 AB Specimen Mount Press

under a high-powered microscope impossible. The plastic supports the edge of the sample to reduce the rounding. Several samples may be mounted together and polished at one time.

The Specimen Mount Press (Buehler, Ltd.) is shown with the mold in place and with half of the cooling unit in place. The heater is in the raised position. The mold consists of a cylinder and two plungers. The top plunger is removed and the specimen placed on the lower plunger. The face of the sample which is to be polished is placed down. The powdered plastic is then poured into the cylinder and the top plunger inserted. Pressure, provided by a hydraulic jack, is then exerted on the plunger by raising the lower platen. The heater is lowered around the mold to melt and cure the thermosetting plastic. The temperature is indicated on the thermometer at the press top.

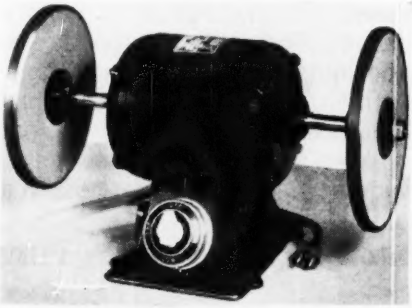
When the transparent thermoplastics are used it is necessary to cool them under pressure. In this case the heater is raised and the cooling blocks are swung into position. In either case, after molding the specimen is pushed out of the mold by the ejector at the left of the machine. The pressure is indicated on the gauge at the lower right. The mold containing the sample may be either 1 or 1¼ inches in diameter and is usually about ⅝ inch high.

1400 AB DISC GRINDER

Before proceeding with the polishing of the rough-ground and mounted sample, it is necessary to fine grind the sample on several successively finer grades of emery papers. This can be accomplished by hand on rectangular sheets or rolls of emery paper, clamped flat on glass surfaces, or on the Buehler Emery Paper Disc Grinder.

This grinder has an extra long shaft extension at either side of the motor. An eight inch diameter plastic disc is mounted on each shaft. A different grade of emery paper may be placed on each side of each disc providing four different grades of grinding abrasive on the same machine.

The Emery Paper Disc Grinder is a two-speed machine providing the proper speed for any of the different abrasives. The paper discs are held on the Bakelite wheels by quickly removable bands which have friction type catches to hold the papers flat.



1400 AB Disc Grinder

After the sample has been ground on the first paper, it is rotated ninety

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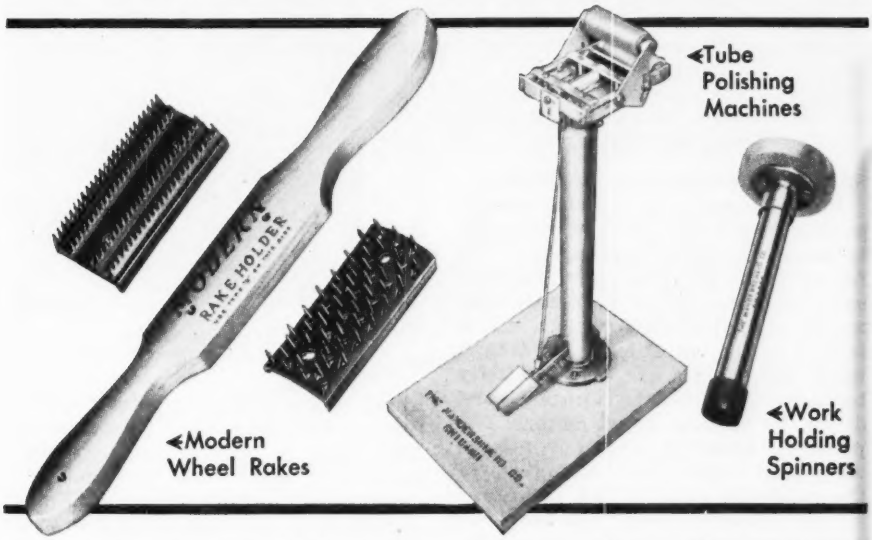

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You'll find this modern wheel rake safe, fast and economical. It will recondition and shape polishing wheels and buffs with a minimum loss of material and without hazard. Write for complete details and prices.

Tube Polishing Machines Improve Workmanship

Rubber rolls tapered against each other drive tubing across face of polishing wheel or abrasive belt. Tube machine produces a uniform finish, free from spiraling. It polishes tubes from ¾" to 5" in diameter.

Work Holding Spinners For Uniform High Speed Polishing and Buffing

Here's a spinner for holding work and producing uniform high speed polishing and buffing. It has totally enclosed grease packed ball bearing construction. Removable fixture flange has machined face and screw holes for attaching wood block or other fixtures. Write for complete literature and price quotation.

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• METAL FINISHING SUPPLIES AND EQUIPMENT •

degrees before grinding on the next finer abrasive. This is done so that it is easily apparent when the scratches left by the coarser abrasive are removed by the finer abrasive. After the scratches have been removed it is advisable to continue with the same abrasive for an equal time so that any disturbed metal caused by the abrasive will be removed. This same procedure is followed with each abrasive.

SAMPLE POLISHING MACHINES

Polishing machines for final sample polishing have horizontal wheels eight inches in diameter, covered with different types of cloth for different samples. The abrasive mixed with water is applied to the cloth which is held to the wheel by a screw type band. The wheels are very carefully balanced to prevent vibration, and driven by variable-speed motors. The polishing wheel is located in a bowl with drain which permits the use of the necessary water in this operation.

Two different operations are ordinarily accomplished on the polishers. In the first, a wax wheel, wax impregnated billiard cloth or canvas is used with a 600-mesh abrasive in the coarse polishing operation. In the second operation a soft cloth such as Miracloth or Microcloth is used with a very fine abrasive in water. The most common abrasive is Alumina, a very fine aluminum oxide with a particle size of 1 micron or less. Chromium oxide, iron oxide and magnesium oxide are also frequently used.

1540-2 AB Two-Unit Polishing Assembly

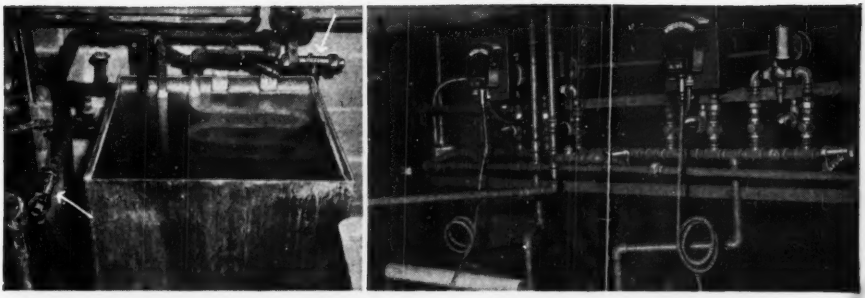
1501 AB Ideal Standard Polisher

For the coarse polishing operation speeds of 500 to 1200 r.p.m. are common, whereas speeds of 150 to 250 r.p.m. are recommended for the final polishing work.

Polishers are available as single units for table top mounting, with flange bowls for flush mounting, and also as single and multiple unit tables.

BAUSCH & LOMB ELECTROPLATER'S MICROSCOPE

Plate thickness measurements may be made on polished samples with a metallurgical microscope. Such a device, designed for accurate determination of plating thickness, is the Bausch & Lomb Electroplater's Microscope, product of the Bausch & Lomb Optical Co., Rochester 2, N. Y. This instrument is the regular B&L Model CM



SARCO *Autothermic* PLATING

You may not be able to make your present equipment completely automatic but you can make it automatic as far as temperatures are concerned at very small cost. That means that no matter how the temperatures and pressures of your steam and water supply vary, or how you are loading the tanks, the temperatures will be within a degree of the point at which you set the dials of the Sarco LSI Plating Control.

It also means that you can change the settings in a second for each tank and each load. This includes all kinds of plating, and alternate heating and cooling. It means that you can read the temperatures on the big dial, custom-cut, for easy reading in your temperature range.

For wash tanks a low cost Sarco Thermoton hooked into the line like an elbow will hold the tank within a few degrees. And for degreasers you can select the Sarco Vapor-line Controls, or the Sarco TR-40 Cooling Control. To save steam, Sarco Traps and Strainers are recommended for each tank or steam coil.

ASK FOR SARCO BULLETINS ON PLATING CONTROL

270

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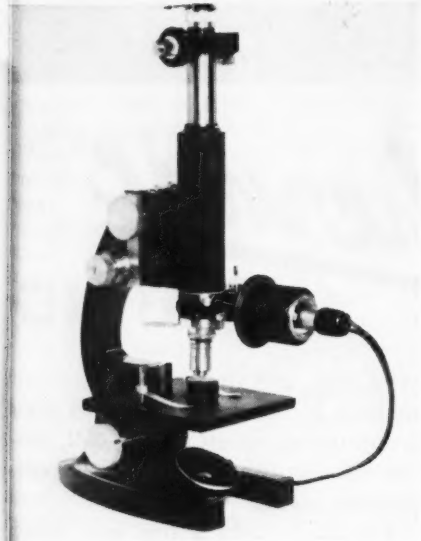
monocular type microscope fitted with a 6 mm. Balcoted achromatic objective and a Filar micrometer eyepiece calibrated so that each least division on the micrometer drum will read 0.00001 inch. Illumination is supplied by a vertical illuminator.



Bausch & Lomb Electroplater's Microscope

The stage can be fitted with an attachable graduated mechanical stage with a range of movement which permits the complete examination of areas up to 65 x 79 millimeters.

Surface Finish Measurement

The determination and evaluation of surface finish roughness of base metal and finished product is becoming an increasingly important factor in the determination of finish quality and appearance. Coincidental with the development of instruments to measure finish roughness has come the development of definite mathematical values to express surface roughness, replacing the old, rather indefinite, descriptive terms.

THE PROFILOMETER BRUSH SURFACE ANALYZER

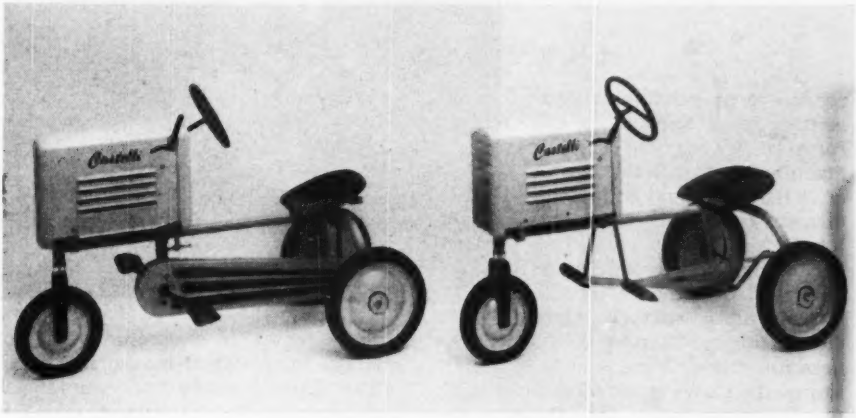
Surface point or trace point analyzers, such as the Profilometer, manufactured by Physicists Research Co., Ann Arbor, Mich., and the Brush Surface Analyzer, manufactured by the Brush Development Co., Cleveland, Ohio, have made a substantial contribution to the advancement of surface quality control. The specific quality measured by these instruments is roughness, which, together with waviness and flaws, is generally supposed to comprise the irregularities found on a surface. The instrument uses an electric "pickup" to trace the irregularities and to convert these mechanical fluctuations into corresponding electrical ones. The instrument amplifier then magnifies these fluctuations until they are powerful enough to actuate a meter. The meter reading thus produced presents the average surface roughness of the part being measured. The reading produced by the Profilometer can be described as the average departure from the "center line." That is, the surface to be investigated should be pictured as a series of hills and valleys and a center line should be drawn halfway between the peaks and valleys—the Profilometer reading represents the average distance between the center line and the line denoting the surface.

On the basis of horizontal spacing, surface irregularities may be grouped into three classes; surface flaws, waviness, and roughness.

Surface flaws have been defined as irregularities of any sort which occur only at one place or at relatively infrequent and widely varying intervals on the surface. Examples are scratches, ridges, holes, peaks, and cracks.

Waviness has been defined as a pattern of surface deviation consisting of

RANDOLPH *congratulates . . . . . .*
F. C. Castelli Co., Philadelphia, Pa.



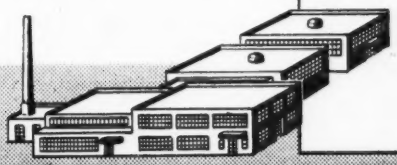
THE NEW CASTELLI "FIRE CYCLE"

The Randolph Products Company, manufacturers of industrial coatings, lacquers and synthetic products, encourages creative initiative, technical know-how, marketing insight, not only in its own organization but in others. It offers its congratulations to the F. C. Castelli Company on the latest addition to its toy line, the "Fire Cycle," dramatically-appealing to the young, would-be firemen of the nation. It offers its congratulations, too, on the Castelli Company's choice of an enamel to give this fine article the perfect finish for a smart appearance that will last—a *single, economical* coat of Randolph Fast Baking Durable S. G. Enamel.

For the best results, rely on a Randolph finish. Randolph finishes include Lacquers, Enamels, Dopes, Thinners, Clear S. G. for Metal, Colored Lacquers, Texture Enamels, Aircraft Finishes, Specialized Production Finishes. Give your product a selling "lift" with a Randolph finish.

INQUIRIES INVITED

Our staff stands ready to consult with you in connection with your finishing operations. If you have any finishing problems, our technicians will be glad to sit down and solve them with you—without any obligation to you, of course.



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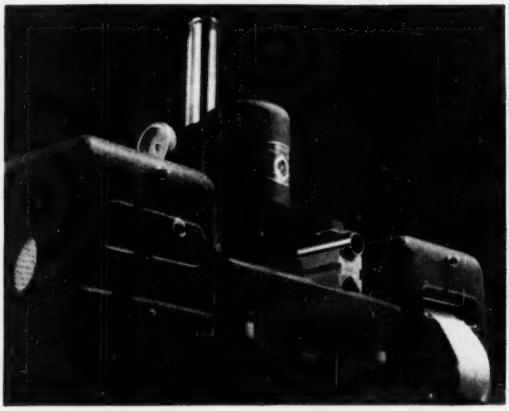


The Brush Surface Analyzer setup, consisting of a pickup arm, drive head, amplifier, magnetic direct-inking oscillograph, surface plate, calibration standard, and V-block supports.

recurrent or random irregularities on a surface in the form of waves. On smooth machined surfaces, the length of such waves ordinarily measures between 1/32 and 1 inch.

Roughness is considered as recurrent or random irregularities on a surface, more closely spaced than waviness. Roughness may be, and frequently is, superimposed on a wavy surface. On smooth machined surfaces, the distance between high spots of such irregularities is ordinarily between 0.0002 and 1/32 inch. The height of these irregularities is much less than their width—generally between 0.000001 and 0.0005 inch.

The readings produced by the tracer point analyzer instruments represent the root-mean-square value or average of the roughness. The root-mean square (rms) is a common type of average in electrical measuring.

The Brush Surface Analyzer (Brush Development Co., Cleveland, Ohio) is another type of surface point analyzer, which has been used for the exploration and charting of surface finishes on metals, glass, wire plastics, paper, plated and painted surfaces, and tool cutting edges.

One application of the Brush Surface Analyzer to plated and unplated surfaces has been the comparison of a steel surface before and after nickel plating, showing the leveling effect of the nickel deposit.

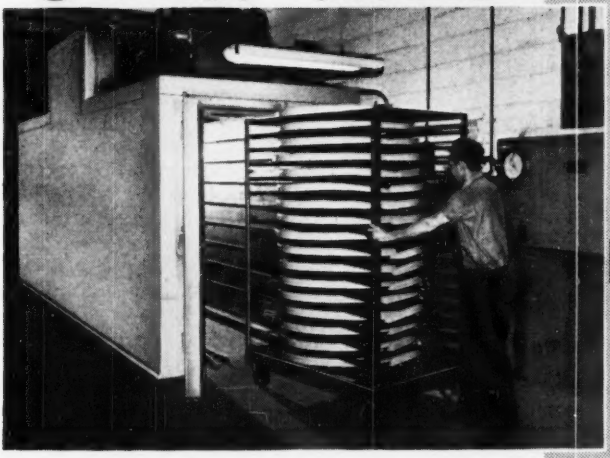
The Profilometer in use

Testing Wear Resistance

TABER ABRASER MODEL 140

Wear or abrasion tests of electroplated surfaces and particularly anodized alumi-

Even heat...



top to bottom

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To assure uniform color on enamel-finished metal trim for plastic table tops, this manufacturer relys on a KIRK & BLUM Oven. Lack of color uniformity on metal trim would ruin attractive appearance of tables.

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Whatever your needs in ovens for drying, dehydrating and baking, consult KIRK & BLUM. For further details, ask for bulletin on "Industrial Ovens."

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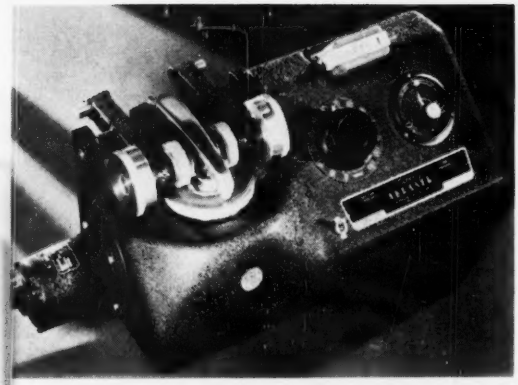


Fig. 1—Taber Abraser Model 140

num and magnesium surfaces, can be used to compare quality of comparable or competitive coatings, as well as to form an estimate of the service life of the product. Wear tests may also be used in routine process control work.

One device used for abrasion or wear testing is the Model 140 Taber Abraser, product of Taber Instrument Corp., 115 Goundry St., North Tonawanda, N. Y. The wear results from alternately rubbing the flat faces of two resilient Calibrase wheels over the surface being tested. A range of standardized abrasive wheels is available for testing all types of surface finishes, including anodic coatings, electroplate, porcelain enamel, organic coatings, leather, glass, plastics, and woven textile fabrics. This tester is the result of 15 years' experience in building various types of abrasion testing equipment.

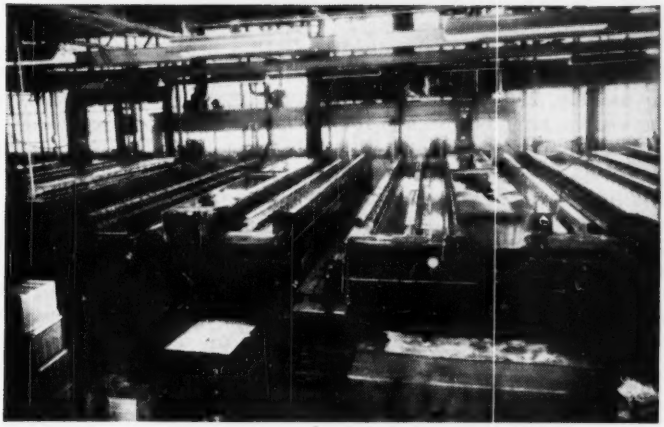
New Abraser features include improved suction pump and vertical dust receiver with swinging nozzle fully adjustable for any specimen thickness. Different materials require a varying degree of suction cleaning while being tested; therefore, the control unit is equipped with a built-in variable transformer for adjusting the speed of the suction turbine motor. The control panel is also equipped with an adjustable timer to provide a test period of 1000 cycles or less, and then to automatically shut off the power.

Switches on the front of the control panel provide any combination of operating conditions, such as with or without vacuum pickup, continuous operation without timer, or timing up to 15 minutes. The Taber Abraser is self-contained and can be readily operated by plugging into an electric outlet.

The new Abraser features sturdier shafts and larger ball bearings, a ca-

Fig. 2 — Taber Model 140 Abraser complete with accessory testing devices, such as vacuum dust remover, and various abrasive wheels and specimen mounting devices.

This Program Gives You PERMANENT PROTECTION *Against Corrosion* *During* METAL FINISHING!



To help you *permanently* control corrosion of equipment used for metal finishing, Haveg Corporation offers you this 2-point program:

1. Personal cooperation in the engineering and installation of Haveg tanks and other equipment
2. Complete manufacturing facilities to mold Haveg equipment to fit your individual needs

This means a *permanent* solution to your corrosion problems during metal finishing. That's because molded plastic Haveg is resistant throughout its entire mass to practically all solutions used for finishing metals. Moreover, you have equipment virtually tailor-made for longer service life, improved production. Many standard shapes available—including tanks, piping, fittings, valves, etc. Write for new Haveg Engineering Bulletin F-6.

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pacitor-type motor with heavy duty worm-gear drive, extra powerful vacuum unit with dual suction nozzle for high efficiency pickup of abradings, and electric counter for registering the wear cycles. The two sets of stainless steel weights, in addition to the weight of the arm, provide three standard ranges of wheel pressures against the specimen; namely, 250, 500, and 1000 grams. Provisions have been made for counterbalancing the weight of the abrading wheels when using the 250 gram load.

The abrading wheel should be selected to correspond as closely as possible with the type of service to which the specimen will be subjected in actual use, and a selection of ten kinds is available.

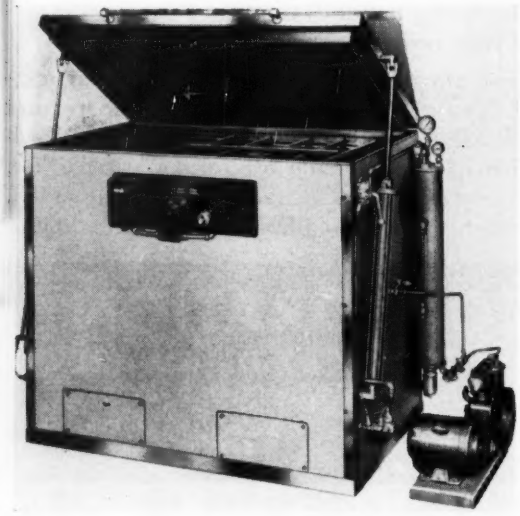
Both qualitative and quantitative wear results are obtainable with the Model 140 Abraser; for example, in judging the quality of material from the standpoint of abrasion resistance, a "wear factor" is calculated which represents the loss in weight per 1000 cycles under a specified set of test conditions. Quantitative or total wear of a specimen surface is indicated by the counter reading from the start of the test to the first sign of penetration. Both methods give a numerical result which is directly comparable for different samples. Where a decorative pattern is embossed or applied underneath a protective coating, the test is usually run to the end point where the appearance becomes objectionable.

Porosity Tests on Plated Coatings

The protective value of coatings of the more noble type, such as copper, nickel, and chromium, on steel is generally recognized to depend to a large extent upon the freedom from porosity of the coatings, as these metal coatings are not rapidly attacked, even in industrial locations.

SALT SPRAY TEST

One method used for evaluating porosity and its relation to corrosion resistance is the Salt Spray Test. This test is used to determine the porosity of nickel or composite coatings on steel or zinc, and is generally considered to furnish results indicative of the quality of the coating. Considerable progress has been made in recent years in defining the conditions for operation of the salt spray test so that reproducible results can be obtained.



One type of salt spray test apparatus is supplied by Industrial Filter & Pump Mfg. Co., Chicago 12, Ill.

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ACID TIN: Uniform, smooth deposits of Tin at approximately 3½ times the rate of alkaline Tin baths at same current density.

TIN FLUOBORATE: Rapid deposition of Tin from a simple, easy-to-operate bath.

COPPER FLUOBORATE: A simple, acid-copper solution depositing more copper in less time than any other type copper solution.

BRIGHT NICKEL: A superior, ductile deposit combining wide application with ease of operation.

LEAD FLUOBORATE: Dependability, simplicity, and fast uniform plating characterize this lead bath.

NIBRITE BARREL: A really BRIGHT bright nickel for barrel plating.

PERFLOW NICKEL: Unusual covering of base-metal imperfections, with resultant savings in polishing and buffing costs. Buffs very easily.

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Literature with complete information is available upon request

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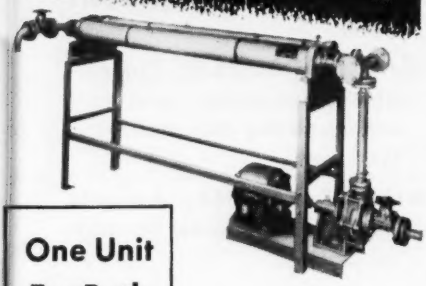

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INDUSTRIAL'S Unit Heat Exchangers are available complete with pump and stand, or tubes alone can be had for wall or ceiling mounting. A wide choice of capacity, too, is possible by using from one to six tubes in a unit. Special units are readily engineered to meet unusual capacity or space requirements.

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FOTOPOR PAPER

Fotopor (Ferroxyl) paper, offered by the Hanson-Van Winkle-Munning Co., Matawan, N. J., is used for detecting pores in nickel plating over iron or steel. In testing, moisten Fotopor paper and metal to be tested. Place inside surface side of the paper on the metal to be tested and let stand two minutes. Wash in running water until the paper is white. Blue spots or specks indicate pores in the plate. The dried paper may be held for permanent reference.

FISHER ELECTROGRAPH

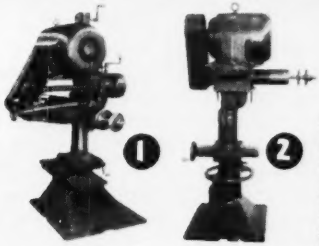
The Electrographic Method has been used for the determination of porosity of metallic coatings, and the Fisher Electrograph, product of the Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa., may be used for this purpose. In this test a flat surface of the coated article is made the anode for a few seconds in a "sandwich" type of cell under pressure in which the cathode consists of aluminum or other metal not yielding colored compounds. A double layer of filter paper moistened with 5 per cent sodium carbonate and 1 per cent sodium chloride solution or an acceptable substitute serves as the intervening electrolyte.

Sufficient potential is applied to the cell to overcome couple action between the coating and exposed base metal, and the current is permitted to flow for a controlled period of 5-15 seconds. The paper member of the cell sandwich is removed and immersed in a solution containing an anion that, with the cations of the base metal, precipitates an identifiable colored compound. It has been reported that the procedure may be simplified by having the indicating agent in the paper of the cell before the test is made. For some coatings on steel a suitable impregnant is potassium ferrocyanide, where the pinholes in the coatings are revealed by the spots of Turnbull's blue.

An example of the use of The Elec-

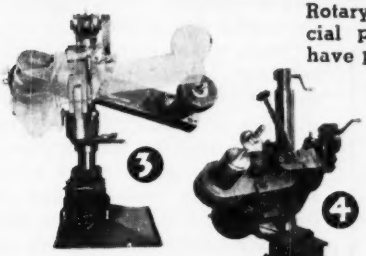
FOR HIGH PRODUCTION POLISHING and BUFFING

ACME Automatic
POLISHING and BUFFING MACHINES



ACME Polishing and Buffing LATHES

Developed from years of experience and successful application to hundreds of polishing and buffing machine arrangements, ACME Adjustable Floating Head Polishing and Buffing lathes have a record of dependable performance under production conditions.
Used in conjunction with ACME Automatics, Rotary, Straightline, Semi-Automatic and Special polishing and buffing machines, they have proved their leadership for years.



1—ACME Type G-1 Heavy Duty Adjustable Polishing and Buffing Lathe. Up to 20 H.P. also furnished in Standard type up to 7½ H.P.

2—ACME Type L-8-L Buffing Head. Vertical and cross slide adjustment, angle and tilt adjustment. Up to 10 H.P.

3—ACME Heavy Duty Adjustable Double Float Polishing and Buffing Lathe. Horizontal and vertical adjustment. Up to 20 H.P.

4—ACME Type G-3 Heavy Duty Adjustable Floating Head Polishing and Buffing Lathe. Up to 15 H.P.

5—ACME Type G-3 Adjustable Polishing Belt Head Lathe with floating back-up wheel.

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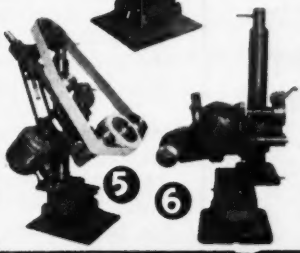
ROTARY STRAIGHT LINE SEMI-AUTOMATIC AND SPECIAL *Polishing and Buffing Machinery*

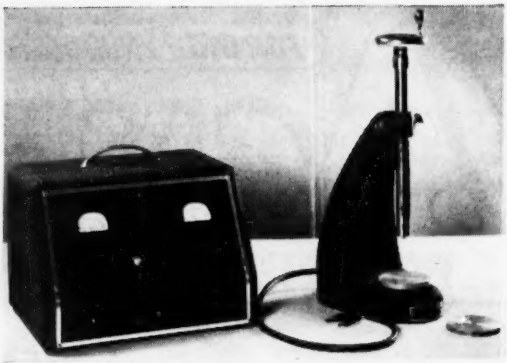


(CATALOGS ON REQUEST)

SPECIAL MACHINERY AUTOMATIC BUFFING MACHINES

ACME Manufacturing Co.
1645 HOWARD ST. DETROIT 16, MICH.
Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

Fisher Electrograph, showing (at left) the power source and (at right) the press stand with connecting leads.



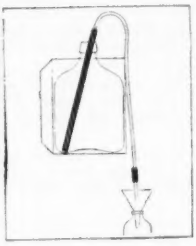
trograph may be cited in the case of the examination of steel, electroplated in the usual way with coats of copper, nickel, and finally, chromium. The sample is made the anode in the Electrograph and transfers made which will reveal pinholes. Where a pinhole in the chromium plate exists, nickel from the undercoat goes into solution as the divalent nickel ion. This reacts with a solution containing dimethylglyoxime and barium hydroxide to form the characteristic red precipitate. Thus, the matter of locating and counting the pinholes is very simple.

The Fisher Electrograph consists of two units. They are the power source and the press stand. Electric current is controlled from the power source. Included in it are batteries, controls for selecting electrode potential and electrode polarity, and meters for reading the current and voltage. From this power source the current passes through leads to the press stand.

There the electrolytic dissolving and transfer takes place. The electrodes are pressed tightly together by the plunger and calibrated spring of the stand. In making tests a piece of bibulous paper, or for more accurate results, gelatin coated paper which has been soaked in a suitable electrolyte, is placed between the two electrodes and the press stand is adjusted to provide sufficient pressure for all parts of the sample to be in intimate contact with the electrolyte soaked paper.

The complete operation of electrically transferring the sample is a matter of a few seconds. Generally, 20 to 30 seconds are sufficient to deposit the few micrograms necessary for a qualitative examination of the sample, or electrographic print.

Speare's Safety Siphon



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Some parts to be processed through North American Aviation's plating department are only plated in certain areas. The practice formerly used was to employ masking and stop-off materials to shield portions of the parts in process during the plating operation.

To eliminate the time-consuming masking operation, J. C. Beasely suggested the use of an adjustable cathode support which would make possible plating of only portions of the parts formerly masked prior to plating. As can be noted in the accompanying photograph, the parts in question are of such a design, and the partial plating is specified for such areas that an adjustable cathode support can be used efficiently for the improvement of this process.

This suggestion was submitted for publication in PRODUCTS FINISHING by Garland C. Ladd, Public Relations Department, North American Aviation, Inc., Los Angeles 45, California.

Send employee suggestions which have resulted in improved finishing processes (electroplating, lacquering, enameling, porcelain enameling, galvanizing, and so on) to PRODUCTS FINISHING. The suggestors will be paid for all suggestions accepted for publication.

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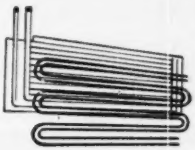

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Spotlighting FINISHING Progress

Recent Developments in Primer Coatings

By DR. ALLEN G. GRAY

WITHIN the past few years an increasing appreciation has developed regarding the underlying mechanism by means of which the failure of paint coatings on metals may occur. The fundamental mechanisms involved in the failure of paints may be related to certain electrochemical aspects of the priming coats, in association with the various factors which determine both initial and retained adherence, as influenced by the effects of moisture, corrosive gases and other environmental conditions. There are other factors related to changes in the internal physical structure of the coating, which may be influenced by application and exposure conditions. Usually the mechanism of paint failure is the resultant of several factors. However, in the priming coat (the paint coating next to the metal surface), electrochemical factors, usually associated with passivity, unquestionably play a part.

It is known that certain corrosion inhibitive pigments exert a defensive action at the metal interface and definitely promote the retention of adherence. The most successfully used rust-inhibiting pigments fall into the general class of reactive pigments, and are usually compounds of lead or zinc. Recent discussions have pointed out that neutral pigments, such as iron oxide, magnesium silicate, and silica have dem-

A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

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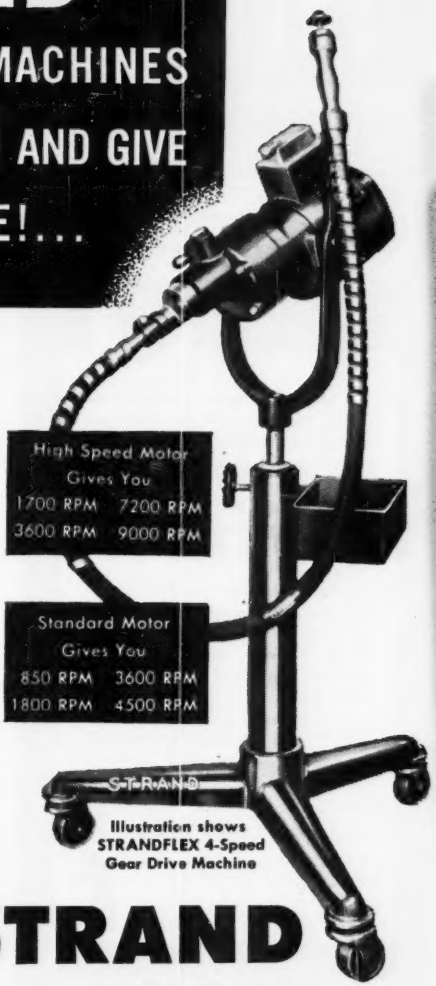

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onstrated definite advantages when used with the reactive zinc or lead pigments. Improvements noted include increased film strength, better adhesion, less reactivity with the vehicle, and a "tooth" which makes for better bond between coats.

Structural Steel Shop Coat Priming Paint

The problem of preventing structural steel from rusting in the interval between shop priming and field painting, that is, while the steel is being shipped, stored, or is being erected, is of prime importance. If the primer fails and the steel rusts during one of these periods, costly field cleaning and repainting are necessary. This problem is one of vital interest to steel fabricators and paint manufacturers alike, and is one to which both industries have devoted considerable attention. The ultimate owner of the steel product is also very much involved in the protection afforded by the shop and field coats because the maintenance and repainting costs will depend to a large extent on the life of the undercoats applied.

At the annual 1949 conference of the National Association of Corrosion Engineers, S. C. Frye, Bethlehem Steel Company, presented before the Protective Coatings Symposium the results of a cooperative program carried out between Bethlehem and the National Lead Company which involved the formulation and performance evaluating of a group of shop coat paint primers. General specifications were set up as a guide in formulating primers for the test, which were as follows:

1. The primer should retard the rusting of structural steel for at least a year, or until the structure can be erected or field coated. Only spot priming should be necessary at the end of this period.
2. The primer should require only the standard wire brush cleaning

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prior to painting, rather than expensive cleaning methods, such as sandblasting or flame cleaning.

3. The primer should be quick-drying, so that the steel can be handled within 8 hours after painting without damage to the paint film.
4. The primer should have an open formula so that it can be supplied by a number of manufacturers.
5. It should have good application properties, so that it can be applied easily and correctly by spray or brush.

For testing the primers, it was pointed out by Frye that four surface conditions, which can be encountered in fabricating shops, were chosen, and are as follows:

Surface "A"—Hot rolled steel with mill scale reasonably intact, as received directly from the rolling mills, with less than 10 per cent of the surface rusted.

Surface "B"—Hot rolled steel allowed to weather until 30-50 per cent of the surface had rusted with consequent removal of some of the mill scale.

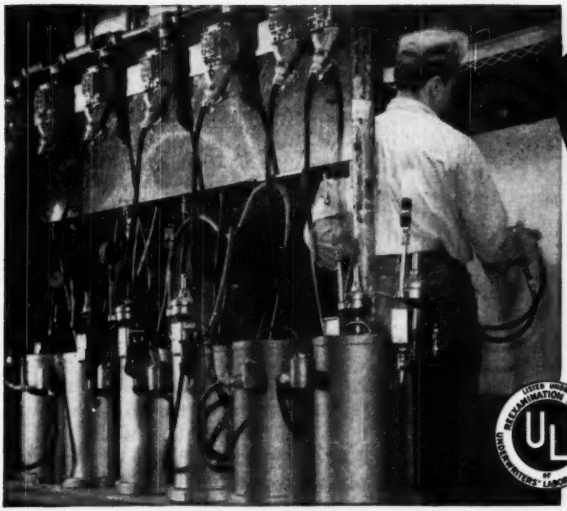
Surface "C"—Hot rolled steel allowed to weather until 60-80 per cent of the surface had rusted with consequent removal of most of the mill scale.

Surface "D"—Hot rolled steel pickled in inhibited acid to remove all of the mill scale and provide a clean rust-free surface for painting.

It was pointed out that surfaces **"B"** and **"C"** are the ones most frequently encountered in fabricating shops, and are also the ones most difficult to protect by painting, in that the surface contaminants resulting from weathering adversely affect paint performance.

Test Procedure

According to the test procedure described by Frye, the panels chosen for test were 12-inch lengths of 4 x 4 x ⅜-inch structural steel angles. It was ponted out that these were selected because it is known that the scale on



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the angles is typical of mill scale found on structural steel. Edge effects such as those encountered in practice are also represented; in addition, this size of angle makes for easy handling necessary during the course of the test.

Another factor studied was the effect on primer paint life of pre-treatment by a wetting agent compatible with subsequent primers. Several series of test panels were prepared by treating the angle surface with a film of raw linseed oil, or modifications of linseed oil, prior to the application of the paint. This was done because of the established ability of linseed oil to thoroughly wet and penetrate the surface of rusted steel.

In the course of the investigation it was brought out by Frye that seventeen paints, using three types of pigmentation, were formulated for the test. The pigmentation and vehicles used are classified as follows:

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Pigmentations:

1. 100 per cent of 97 per cent grade red lead.
2. 75 per cent of 97 per cent grade red lead and 25 per cent of iron oxide.
3. 60 per cent of 97 per cent red lead, 20 per cent of iron oxide, 15 per cent of magnesium silicate, and 5 per cent of mica.

Vehicles:

1. Raw linseed oil.
2. Alkyd resin solution—25 per cent phthalic anhydride linseed oil type—70 per cent solids.
3. Alkyd resin solution—34 per cent phthalic anhydride linseed oil type—50 per cent solids.
4. Alkyd resin solution—30 per cent phthalic anhydride linseed oil type—50 per cent solids.
5. Alkyd resin solution—34 per cent phthalic anhydride linseed oil type—50 per cent solids, raw linseed oil added.
6. Alkyd resin solution—27 per cent phthalic anhydride castor oil type —80 per cent solids.
7. Phenolic varnish—composed of 100 per cent para phenyl phenol formaldehyde resin, 60 per cent chinawood oil, 40 per cent linseed oil—60 per cent solids.
8. Oil combination, 20 per cent chinawood oil—80 per cent boiled linseed oil.

The paints were applied by spray since this is the method generally used in fabricating shops. However, they could have been brushed. Panels of surfaces **"A"**, **"B"**, and **"C"** were hand wire brushed and solvent washed. Panels of surface **"D"** were pickled and dried just prior to painting.

The paints were applied by what was termed by Frye as normal controlled film thicknesses. Normal film thickness was defined as the film thickness of paint which an experienced operator would think necessary to properly coat the panel. Controlled film thickness involved the application of a pre-

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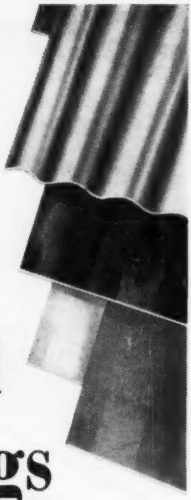

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calculated amount of paint to obtain a uniform dried film thickness of 2.0 mils plus or minus 10 per cent.

In conducting the tests the panels were exposed at 45 degrees facing south, at Perth Amboy, N. J., an industrial marine site, and at New Kensington, Pa., an inland semi-industrial site. The members of the inspection committee agreed on certain standards for determining the protective value of the paint system during the course of exposure. The rating system used is outlined as follows:

Rating 8—This rating was given to those panels on which the condition of the primer surface was such that no touch-up work would be required prior to subsequent painting; it approximates A.S.T.M. D-610-43 Type 2, No. 8.

Rating 7—This rating was given to those panels on which the condition of the primer surface would require no more than 20 per cent spot priming prior to subsequent painting. This rating approximates A.S.T.M. D-610-43 Type 2 No. 7.

Rating 6—This rating was given to those panels on which the condition of the primer surface had failed just sufficiently to require complete repriming prior to subsequent painting. This rating approximates A.S.T.M. D-106-43 Type 2 No. 6.

Rating 5, 4, 3—These ratings, corresponding to A.S.T.M. ratings of 5, 4, and 3, were also included to bring out further differences and excessive failures among the primers that require complete repriming.

In order to differentiate further between panels that had a rating of 8, and those that were in better condition, a rating of 8+ was given to panels that would have an A.S.T.M. rating of 9 or 10. The panels were inspected at both test sites after 9, 13, and 19 months of exposure.

Results of Tests

In discussing the results of the tests, Frye indicated that significant failure of various primers had occurred after

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13 months, particularly on the corroded or rusted surfaces "B" and "C." It should be kept in mind that these surfaces are either typical of, or slightly poorer than the majority of structural steel surfaces to which primer paints are applied. It was brought out that the freshly rolled surface "A", and the pickled surface, "D" showed very little failure. However, it should be remembered that, in general, it is impossible to obtain surface conditions comparable to "A" and likewise it is generally impractical to pickle structures or clean by sandblasting just before painting, which is the condition represented by surface "D". Thus, an important point is that the conclusions based on the life of primers applied to surfaces "B" and "C" are of the most practical value .

After 19 months' exposure, 100 per cent red lead in linseed oil was the primer which afforded the best protection, based on the average rating for a controlled film thickness of 2 mils, and also for the normal method of application. However, this 100 per cent red lead in linseed oil primer did not meet requirement 3 in the specification set-up, namely that it took longer than 8 hours to dry.

According to Frye, of the primers that met the 8-hour, dry-to-handle requirement, the following two afforded the best protection on "B" and "C" surfaces throughout the test: (1) A pigment combination of 60 per cent red lead, 20 per cent iron oxide, 14 per cent magnesium silicate, 6 per cent mica, in 34 per cent phthalic anhydride linseed oil glycerol phthalate resin; (2) 100 per cent red lead in 30 per cent phthalic anhydride linseed oil glycerol phthalic resin thinned with 2 per cent (by volume) of a 1:1 mixture of V.M.&P. naphtha and kerosene. Indications from very limited test results were that a primer composed of 100 per cent red lead in a 27 per cent phthalic anhydride glycerol phthalate dehydrated castor oil resin gave excellent results.

One point brought out by Frye before the N.A.C.E. Protective Coatings Symposium was that pre-treatment of the rusted surface had a decided beneficial effect on the life of the primer. Three types of pre-treatment oils were used: (1) raw linseed oil; (2) Complex A—a maleic anhydride treated linseed oil; (3) Complex B—a maleic anhydride treated linseed oil containing a higher percentage of maleic anhydride. It was reported that raw linseed oil performed the best on a number of tests, and that Complex A, on the basis of one test, was as good as raw linseed oil. Complex B was described as not as good as raw linseed oil.

These tests indicate that after pretreating the surfaces with linseed oil, the various primer paints tested, including the one with 100 per cent alkyd vehicle, performed practically as well as red lead in linseed oil on un-pretreated surfaces. Figure 1, presented

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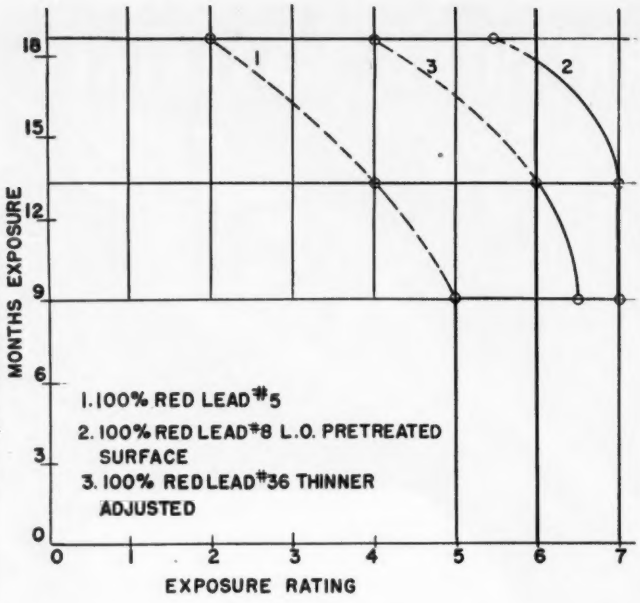

Fig. 1—Graph of exposure rating as a function of months of exposure for 100 per cent red lead in a 30 per cent phthalic anhydride, linseed oil alkyd on "B" surfaces. The beneficial effect of linseed oil surface pre-treatment (curve 2) compared with surfaces not pre-treated (curve 1) is also shown. Curve 3 shows the beneficial effect of thinners. (*Illustration courtesy National Association of Corrosion Engineers*)

by Frye before the N.A.C.E. members, is a graph of exposure ratings expressed as a function of months of exposure, which shows the beneficial effect of pre-treatment and the thinner adjustment mentioned previously, that is, the addition of 2 per cent of a 1:1 mixture of naphtha and kerosene.

The primer used in this test was 100 per cent red lead in a 30 per cent phthalic anhydride linseed oil alkyd. The heavy line drawn in Fig. 1 at the exposure rating of 6 serves as an indication of the point at which complete repriming is necessary. Portions of the curves (solid lines) to the right of this line are at ratings where no touch-up, or only 20 per cent touch-up is necessary before repainting. In a like manner, the portions of the curves (dotted lines) to the left of the heavy line indicate that failure has progressed beyond the point at which complete repriming is necessary. Thus, it can be seen from Fig. 1, that the primer on the un-pretreated surface (curve 1) has failed beyond the point of complete repriming even at 9 months, while the same primer on a linseed oil pre-treated surface (curve 2) gave good protection well past the 13 months' inspection and almost up to the 19 months' inspection.

Included in the test program discussed by Frye before the N.A.C.E. was the influence of vehicles on weathering, regardless of pigmentation. A summary of these studies is shown in Fig. 2. On **"B"** and **"C"** surfaces, raw linseed oil and 34 per cent phthalic anhydride glycerol phthalate linseed oil vehicles (curves 1 and 3 of Fig. 2) were the best overall vehicles, and the latter met the drying time specification, while raw linseed oil did not. The 27 per cent phthalic anhydride dehydrated castor oil resin (curve 7 of Fig. 2) also appeared good on the basis of limited tests. Curve 10 of Fig. 2 is the exposure rating of U.S.M.C. 52-MC-29 primer paint, which is zinc chromate, zinc oxide, titanium dioxide, and extender in a linseed oil modified alkyd.

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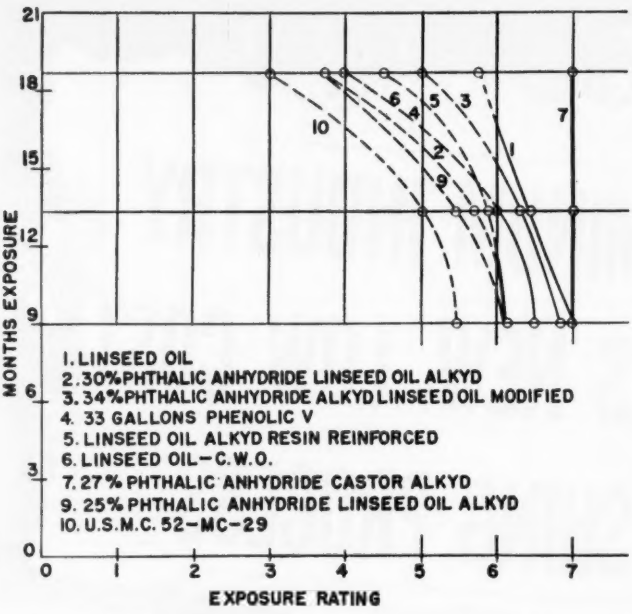
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9. 25% PHTHALIC ANHYDRIDE LINSEED OIL ALKYD
10. U.S.M.C. 52—MC—29

Fig. 2—Curves showing the exposure ratings as a function of months of exposure on "B" surfaces for the various vehicles used in the tests reported. One hundred per cent red led was the pigmentation used, except for curve 10 which is based on a zinc chromate primer. (*Illustration courtesy National Association of Corrosion Engineers*)

various pigments were tested with the same vehicle. Three pigmentations were tested with linseed oil vehicle; namely, 100 per cent red lead, 75 per cent red lead and 60 per cent red lead. The results obtained showed a performance better than an exposure rating of 6 in all cases. However, it was pointed out that these primers had the disadvantage of having prolonged drying times, thus not meeting this requirement of the test.

A graphical presentation of the performance of different pigmentations in various vehicles showed that, except for the dehydrated castor oil vehicle, all of the curves were on the failure side of exposure rating 6. Further analysis of the graphical data indicated that no one pigment combination was outstanding in its performance; that is, no one pigment was materially better than the others. Evidently all of the combinations contained sufficient corrosion inhibiting pigments to give good protection.

According to Frye, Bethlehem Steel Company has considerable success with a 75/25 red lead/iron oxide pigment combination as a shop coat. For a primer of this type either a glycerol phthalate linseed oil modified resin or a phenolic resin chinawood oil-linseed oil varnish is specified as the vehicle.

"Buffing Compound Removal Was a Tough Job," is the title of a folder available from the Cowles Chemical Co., 7016 Euclid Ave., Cleveland 3, Ohio, which describes in detail the use of Cowles SO Cleaner, an emulsion cleaner to be used in still tanks or automatic machines to loosen impacted buffing dirt and ensure its complete removal in the electrolytic cleaner.

Process Control Instruments. Fischer & Porter Co., Hatboro, Pa., has available Catalog 86 which illustrates and describes Ratotherm and Ratogage Temperature and Pressure Instruments, including combinations of temperature, pressure flow, and so on, in one instrument case, and discusses cascade control. Also included is a description of the Type 3 Pneumatrol unit with proportional band, automatic reset and derivative action control.

This *INFRA-RED* system SAVES 300% in Baking Time and Space!

Fostoria Pressed Steel Corporation installation at the White Motor Co., Cleveland.

This ceiling-suspended, twin tunnel at the White Motors plant highlights again the many advantages of finishing products with infra-red baking. For example:

1. Baking is done in 5 minutes – as against 20 with other systems.
2. Only a 75-foot *overhead* space was used – saving valuable floor area and permitting compact, continuous conveyance of work.
3. The installation is expected to result in savings of materials and in operational efficiencies.
4. Quality control is easier.
5. Only reasonable maintenance required.

Why not learn what an infra-red baking system can do for *you*? Chances are you, too, will find it a *faster, more versatile* and *lower cost* oven.

CHECK UP ON LAMPS, TOO! Amplex offers the most complete line of industrial infra-red lamps. Also available is a complete new line of infra-red lamps with "Moisture-cote" protection. This protection means amazing resistance to breakage from paint drippings, splashing, condensation – yet the lamps cost little more than ordinary lamps!

Write Amplex Corporation, Dept. 56, 119 Water Street, Brooklyn 1, N. Y.

amplex

manufacturers of industrial lamps • vibration service lamps • shockproof lamps • sealed beam reflector lamps • reflector spotlights and flood lights • street lamps • traffic signal lamps.

Finishes

The finish on the case of the Hygrodial, which measures relative humidity and temperature, is baked gray Hammerlin enamel. The numerals on the humidity scale are satin finished aluminum on an etched black background. The trim and identification plates are finished in bright nickel plate.

(Photo courtesy Abbeon Supply Co., New York, N. Y.)

The inside container and the outer walls of the Burpee French Fryer are spun from 525 aluminum. The exterior surface is polished on abrasive belts and then buffed to a high luster.

(Photo courtesy Burpee Can Sealer Co., Barrington, Ill.)

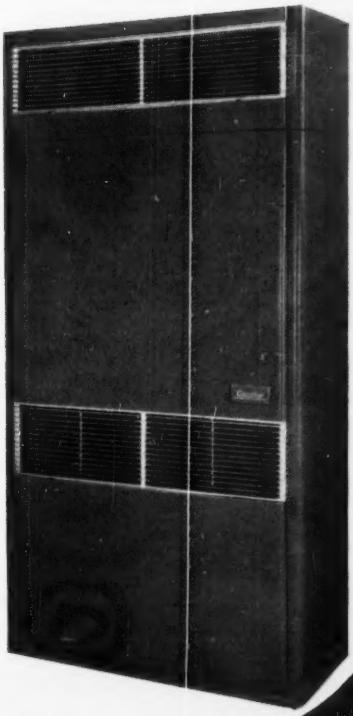
The National Cigarette Vending Machine, Model 9EC, is attractively finished in walnut and mahogany (graining on steel panels) with chrome and stainless steel trim.

(Photo courtesy National Vendors Inc., St. Louis, Mo.)

that aid in appearance and utility

The Apex Wash-A-Matic features a white porcelain enamel steel top section while the body and skirt are finished in white baked enamel. Chromium plated hardware and trim strips provide attractive contrast.

(Photo courtesy The Apex Electrical Manufacturing Co., Cleveland 10, Ohio)



The Carrier Weathermaker Air Conditioner is attractively finished in baked enamel available in a wide range of colors to harmonize with existing room shades.

(Photo courtesy Carrier Corp., Syracuse, N. Y.)

NEWS of the Industry

COMPANIES

THE DeVILBISS COMPANY will open a new assembling, warehousing and distributing plant in Santa Clara, California, in June, according to an announcement made by Howard P. DeVilbiss, president. The company, with main office and plant in Toledo, Ohio, manufactures complete spray painting equipment, air compressors, hose, spray paint booths, atomizers and related items.

The new plant will serve the territory covered by DeVilbiss sales branches in San Francisco, Los Angeles and Salt Lake City.

Winners of the contest sponsored by the **FERRO ENAMEL CORP.**, Cleveland, Ohio, to promote interest in porcelain enameling education by ceramic engineering students were recently announced at the 52nd Annual Meeting of the American Ceramic Society. Winners of the five prizes were: **JESSE DeLAFAYETTE WALTON, JR.**, Georgia Institute of Technology; **JOHN C. HORSFALL**, University of Washington; **CHARLES K. RUSSELL**, University of Illinois; **GORDON P. K. CHU**, Pennsylvania State College; and **JAMES H. HEALY**, University of Illinois.

Possible cost saving in chromic acid anodizing, as well as other metal treatments such as copper stripping, brass pickling, magnesium dips and chromium plating, are indicated through the use of oxidation-resistant cationic exchange resins. In a preliminary investigation by **MUTUAL CHEMICAL COMPANY OF AMERICA**, New York City, certain commercial resins have been found which are stable in the presence of chromic acid, and can be used for removing dissolved metals, with recovery of the chromic acid for re-use. An added advantage is the minimizing of the potential problem of waste disposal.

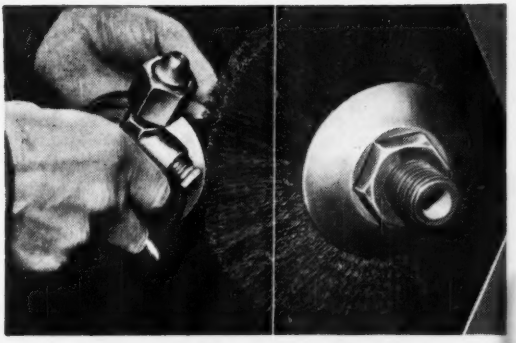
Stockholders of **THE UDYLITE CORPORATION**, at the annual meeting held in April, approved the proposal to acquire **FREDERIC B. STEVENS, INC.**

An agreement was reached between the officers of the two companies last January but formal consummation was withheld until the proposal could be voted upon by stockholders of the respective companies. Both companies are manufacturers and suppliers of equipment for the plating industry. The Stevens Company is also a manufacturer of foundry supplies, polishing and buffing compounds. The Udylite Corporation has five plants in Detroit while the Stevens Company operates plants in Detroit, Buffalo, New Haven, Connecticut, and two wholly owned subsidiaries have plants at Windsor, Ontario, and Springfield, Ohio.

Frederic B. Stevens, Inc., will operate as a wholly owned subsidiary of The Udylite Corporation.

Formation of the **KROMALL CHEMICAL AND DISPERSIONS CORPORATION**, which has perfected improved techniques for the manufacture of high quality pigment dispersion that will enable paint companies to produce enamels and lacquers having maximum gloss, coverage, adhesion, and hiding powers, has been announced by Eugene G. Bloch, president. The new company whose executive offices and plant are located at 10-12 46th Avenue, Long Island City, will make the pigment dispersions in a wide range of colors.

PITTSBURGH BRUSHES



OUTLAST COMPETITION 3 TO 1

says the Bastian Blessing Company,
Chicago manufacturer of soda fountains and equipment

At the Bastian Blessing Company ordinary power-driven brushes were used to satin finish brass parts and debur small threaded pieces.

Frequent breakdowns and changes forced the company to seek a superior brush. From a wide variety of makes, Bastian Blessing selected Pittsburgh brushes because *"these lasted three times as long as the nearest competitive brush tested,"* . . . were softer, more flexible, and lasted longer . . . gave a better finish.

After three years of use, the company reports: *"Increased production, improved quality and greater material savings."*

Let Pittsburgh brush engineers show you what they can do

Just tell us your special brush problems and our staff of skilled engineers will quickly, efficiently design and build power-driven brushes to meet your requirements precisely.

Or, you may find exactly what you are looking for in our regular Pittsburgh line . . . which includes sections, wheels and assemblies for every industrial use, whether it's glass, steel, or plastics . . . paper, tires, shoes or automobiles.

***For full information, write or phone* PITTSBURGH PLATE GLASS CO., *Brush Div.*, Dept. W-6, 3221 Frederick Avenue, Baltimore 29, Maryland.**

PITTSBURGH *Power Driven* **BRUSHES**

BRUSHES • PAINT • GLASS • CHEMICALS • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

The **ALSOP ENGINEERING CORPORATION,** Milldale, Connecticut, was host to all employees and guests at a banquet recently in observance of the 30th Anniversary of the firm's founding.

The Alsop Engineering Corporation was formed in 1920 as a one-man institution with walk-up quarters in a building on Water Street in downtown New York. During a period of fourteen years the company moved to several larger locations in New York City and in 1936 purchased the present building in Milldale. Today the company does all its own manufacturing from the raw materials to the finished machines and has extended the line of liquid processing equipment to the four corners of the world. The company maintains offices or distributors in every major city in the United States and also in South America and Europe.

At the dinner, awards were presented to employees with 25, 15, and 10 years of service with the company.

THE BUCKEYE PRODUCTS CO., Cincinnati, Ohio, manufacturer of Speedie buffing and polishing compositions and polishing room accessories, has completed the second expansion to its plant since the end of the war. The new building will provide additional space for both manufacturing and warehouse facilities. Considerable new equipment has also been installed in the plant so as to increase production and provide engineers with improved methods for constantly checking the uniformity of all products manufactured.

The New York offices of **RAYBESTOS-MANHATTAN, INC.,** are now located at 500 Fifth Avenue, New York City, corner 42nd Street. The previous location was at the Equitable Building at 120 Broadway.

These offices include the New York and New England district office of the Manhattan Rubber Division and the Corporation Export Department, including Allied Asbestos and Rubber Company (Export) Inc.

RAPID ELECTRIC CO., Bronx 61, N. Y., manufacturer of a complete line of selenium rectifiers and periodic reverse units, announces that it has retained the consulting services of Henry Levine & Son Inc., Forest Hills, N. Y., well known metal finishing consultants in the East.

The association will enable Rapid Electric to offer a consulting service to its customers, assisting them in specifying the proper rectifier or periodic reverse unit. There will be no charge for this service.

The **INDUSTRIAL CHEMICAL & EQUIPMENT CO.,** Minneapolis, Minn., announces that it is now located at 205 11th Avenue South, Minneapolis 15. The new location affords considerably larger office and warehouse area, as well as increased space for chemical laboratory expansion.

Industrial Chemical and Equipment Company specializes in sales and consulting to the finishing industry, representing many leading manufacturers of electroplating, degreasing, as well as polishing equipment and supplies. In addition to the sales engineering, the company maintains a large chemical laboratory where regular plating solution analyses are made as a service to customers.

YOUR SIGNAL!

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Clear Metal Lacquer

... FOR ...

SILVER, CADMIUM, ZINC, COPPER, BRASS, ALUMINUM

Outstanding

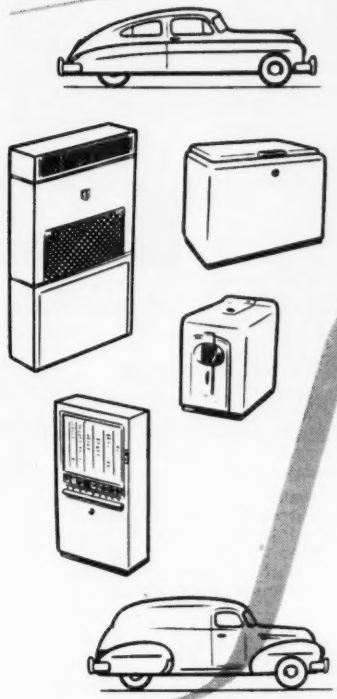
1. **Adhesion to metal surfaces**
2. **Resistance to sulfur tarnish**
3. **Resistance to oxidation**
4. **Resistance to perspiration**
5. **Resistance to abrasion**

Pale in color. Takes 100-200% reduction. Dries under 15 minutes.

A premium product—priced at ordinary lacquer levels.

The Varnish Products Company

5208 Harvard Avenue **Cleveland, Ohio**



America's proudest products wear

BONDERITE

under the paint!

BONDERITE PRESERVES APPEARANCE

1. By anchoring paint
2. By retarding rust and corrosion
3. By preventing spread of paint failure around accidental damage

High eye-appeal products – products that sell and stay sold on beauty as well as performance – depend on the appearance protection of Bonderite.

This simple, adaptable, dependable treatment produces a nonmetallic, corrosion-resistant coating that is a perfect base for paint. Its first cost is low, its results are sure and lasting.

Bonderite under the paint makes paint finishes look better longer!

Proud

OF YOUR PRODUCT'S APPEARANCE?

Give its fine paint finish the protection it deserves! Find out how Bonderite will fit into your plant. Write for full information.

Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

PARKER

PARKER RUST PROOF COMPANY
2177 East Milwaukee Ave.
Detroit 11, Michigan

BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant • PARCO LUBRITE—Wear Resistant for Friction Surfaces

NEW YORK BLOWER CO., Chicago, Ill., has announced the appointment of A. A. Maycock Co., 234 Seventh Ave., Salt Lake City, Utah, as its representative in that area.

THE ELECTRIC PRODUCTS CO., Cleveland, Ohio, has appointed Vincent J. Brown Company as district representatives for New York State with the exception of Metropolitan New York City.

The Vincent J. Brown Company maintains offices in Buffalo and Syracuse.

Laurence S. Watson, president of **APEX CHEMICAL MFG. CORP.**, Detroit 8, Mich., manufacturer of alkali and emulsion cleaners, has announced the appointment of the company by Optimus Equipment Company as exclusive distributors of Optimus vapor degreasers, metal parts washers, dryers, Optimus trichlorethylene and perchlorethylene.

NEW POSITIONS

Marion Industries, Division of Motor Products Corp., Marion, Ohio, has announced the appointment of **FRED G. BRUNE**, as superintendent of plating and buffing.

Fred G. Brune

Mr. Brune, a graduate of the University of Cincinnati with the degree of chemical engineer, was formerly chemical supervisor at the Lockland Division of Electric Auto-Lite Company. Quite active in the Cincinnati Branch of the American Electroplaters' Society for several years, he served as president during 1949-50.

The Minnesota Mining & Manufacturing Co. has promoted one officer and elected two new ones, it was announced recently.

CLARENCE M. KING, former assistant treasurer and assistant secretary, has been named treasurer. He will continue as assistant secretary. **GEORGE H. SCHOETTLY** and **EDWIN H. CHURCH** are new assistant treasurers.

Clarence M. King

Mr. King joined the firm in 1926 as an accountant and was later appointed auditor. He became assistant treasurer in 1939 and was also elected assistant secretary in 1948.

Mr. Schoettly first served 3M as a bookkeeper for a year, then became assistant credit manager. He held that post for five years, and was credit manager for 20 years prior to his new promotion.

Mr. Church was controller of the Inland Rubber Corporation of Chicago, a former subsidiary of Minnesota Mining, before joining the company in 1949, and was auditor of disbursements before assuming the post of assistant treasurer.

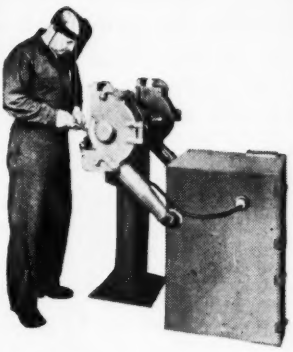
EDWARD D. WILLIAMS, formerly sales manager of the X-Ray Products Division of The Ansco Company, has been appointed sales manager of Production Finishes Division of The Arco Co., Cleveland, Ohio, manufacturer of paints, varnishes, lacquers, enamels, and protective coatings.

Mr. Williams, 1937 graduate of Amherst College, served in National Carbon Company's foreign division in New York and later was acting sales manager of its sales organization in India.

G. L. Hehl, general manager of the Industrial Finishes Division of The Sherwin-Williams Co., Cleveland, has announced the appointment of **DONALD S. GAARDER** as assistant general manager and **LEE COTTON** as co-ordinator of technical operations for this division of the company's activities.

Should you take a chance?

The odds on filling an inside straight are 11 to 1.



TORIT Dust Collectors

Torit Dust Collectors, ranging in size from ½ to 5 H.P., are kept in stock. These fit all standard grinding, cut-off and polishing machines. Adaptations or special designs can be created for you by our engineering department.

Take no chances with abrasive dusts. Use

TORIT DUST COLLECTORS

No abrasive dusts will damage expensive equipment when machines are equipped with Torit Dust Collectors. No extensive piping obstructs lighting arrangements. Your production layout remains undisturbed, because compact, self-contained Torit Dust Collectors fit into odd spaces and require little room. They are reasonably priced, and operating and maintenance expenses are low.

Write us and learn why Torit Dust Collectors are ace high with so many industries.

TORIT

Manufacturing Co.

314 Walnut St., St. Paul 2, Minn.

P.S. Ask for latest Torit Catalog

Lee Cotton (left), Donald S. Gaarder

Mr. Gaarder will assist Mr. Hehl in managing the Industrial Finishes Division, which deals with product finishes and finishing methods of producers, fabricators and reconditioners in the appliance, furniture, implement, automotive and many other industries.

Mr. Cotton will handle liason between Industrial Division headquarters at Cleveland and Sherwin-Williams Laboratories at Chicago, Newark, Dallas, Cleveland, Oakland, Los Angeles, and Gibbsboro, New Jersey.

DAVID BUSKER, previously associated with Hilo Varnish Corporation, Roxalin Flexible Finishes, and the National Bureau of Standards, has joined Better Finishes and Coatings, Inc., Newark, New Jersey, manufacturer of industrial finishes and peelable plastic coatings.

David Busker

A graduate of the College of the City of New York, University of Maryland and the Newark College of Engineering, Mr. Busker is well known for his contributions on coatings to the "Plastics Encyclopedia" as well as leading technical publications in the chemical and coatings field. In his new connection he will be in charge of the development of special purpose industrial finishes.

Frederic B. Stevens, Inc., Detroit 16, Mich., has announced the appointment of **J. D. JOHNSON** to its sales organization. With headquarters at the Detroit Office, he will cover part of the western and northern Michigan territory.

J. D. Johnson

Mr. Johnson is a graduate of the University of Detroit, where he received the degree of Bachelor of Mechanical Engineering. He has a well founded background of sales and research work, having spent about two years in the latter field with the Research and Development Division of the U. S. Army at the Detroit Arsenal.

Liquid Plastics Division of Ferro Enamel Corporation, through its manager, L. H. Miller, has announced the addition to its sales staff of **PHILIP J. CARRAGHER**. Mr. Carragher will handle the sale of Vedoc Organic Finishes in western Ohio.

Philip J. Carragher

Mr. Carragher attended Akron University, and began his selling career with the Witco Chemical Company as industrial chemical sales representative to the rubber trade.

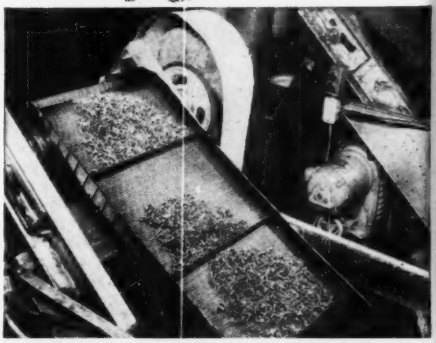
Following 6 years' service with the Army, he spent a year with the Goodyear Export Company in Akron, Ohio, as an operational sales assistant. Mr. Carragher then moved to the West Coast, where he was employed by the Glidden Company as representative in the Los Angeles and northern California areas, and later by the Parraffine Company, Inc., as industrial paint representative in the Los Angeles territory.

Cambridge WOVEN WIRE BELTS

Tailored to your Production Needs

Your Cambridge woven wire conveyor belt is engineered from the raw materials to the finished belt to give you maximum efficiency with a minimum of attention and maintenance.

Cambridge designs withstand heavy loads, high temperatures, cold, corrosive compounds or wet processes. They may be fabricated of any metal alloy in any mesh and weave. Where necessary, Cambridge belts can be fitted with various types of selvages, cleats and drives.



A Cambridge Rod-Reinforced Belt with Plate Selvages and Fabric Cleats provides cost-cutting continuous quenching of screws, nuts and bolts. This belt design offers the highest tensile strength, low thermal capacity and successful operations in temperatures as high as 2100° F.

Call your Cambridge Field Engineer whenever you have a problem concerning movement of materials during processing.

VALUABLE BOOK, FREE! A complete, basic reference on conveyor belts, designs, systems and metallurgy. Write for your copy or call your nearest Cambridge office.

Cambridge Wire Cloth Co.

Wire cloth in rolls. | Also specialized wire fabrications

Department A
Cambridge 6, Md.

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

See "Belting, Mechanical" in your Classified Telephone Directory.

Appointment of **ALBERT D. WAGEN** as Pacific Coast divisional director for Pittsburgh Plate Glass Company's paint division has been announced by E. D. Griffin, vice president.

Albert D. Wagen

Associated with Pittsburgh Plate's paint manufacturing operation since 1935, Mr. Wagen joined the firm as an accountant at the Milwaukee plant. He was appointed Pacific Coast divisional accountant during 1941 and has served as assistant to the divisional director of West Coast operations during the past three years.

Mr. Wagen, a University of Wisconsin graduate, is a member of the Executive Committee, Los Angeles Paint, Varnish and Lacquer Association, and a director of the Los Angeles Chapter, National Association of Cost Accountants.

As divisional director, Mr. Wagen succeeds Louis F. Theurer who has retired after 31 years' service with the paint division.

TRAINING COURSES

THE JOSEPH B. KUSHNER ELECTROPLATING SCHOOL of Stroudsburg, Pennsylvania, announces the inauguration of three intensive, one-week summer lecture courses in special electroplating subjects, to be given in Stroudsburg.

The subjects and dates are as follows:

Week of August 6. Modern Electroplating Principles. A comprehensive survey of the theoretical principles behind modern electroplating practice. High school education or better required.

Week of August 13. Gold Plating Techniques and Problems. Special techniques and modern methods in gold plating. An intensive lecture course for those with previous experience and knowledge in gold plating only.

Week of August 20. Recent Developments in Electroplating. A thorough survey of new and recent developments in electroplating and their importance. The direction of future trends in electroplating. Lecture course for executives, chemists, and engineers.

The tuition fee per course is $30, which covers enrollment and original text material supplied to each student. All enrollments and reservations for accommodations must be placed before July 15 with the director, Joseph B. Kushner Electroplating School, 115 Broad St., Stroudsburg, Pennsylvania.

Free two-day courses of instruction designed especially for teaching methods of repairs to previously finished surfaces which have been damaged, are being conducted throughout the country by E. W. Hagadorn, president of **FINISHINE LABORATORIES, INC.**, 627 Tallman St., Syracuse 4, New York.

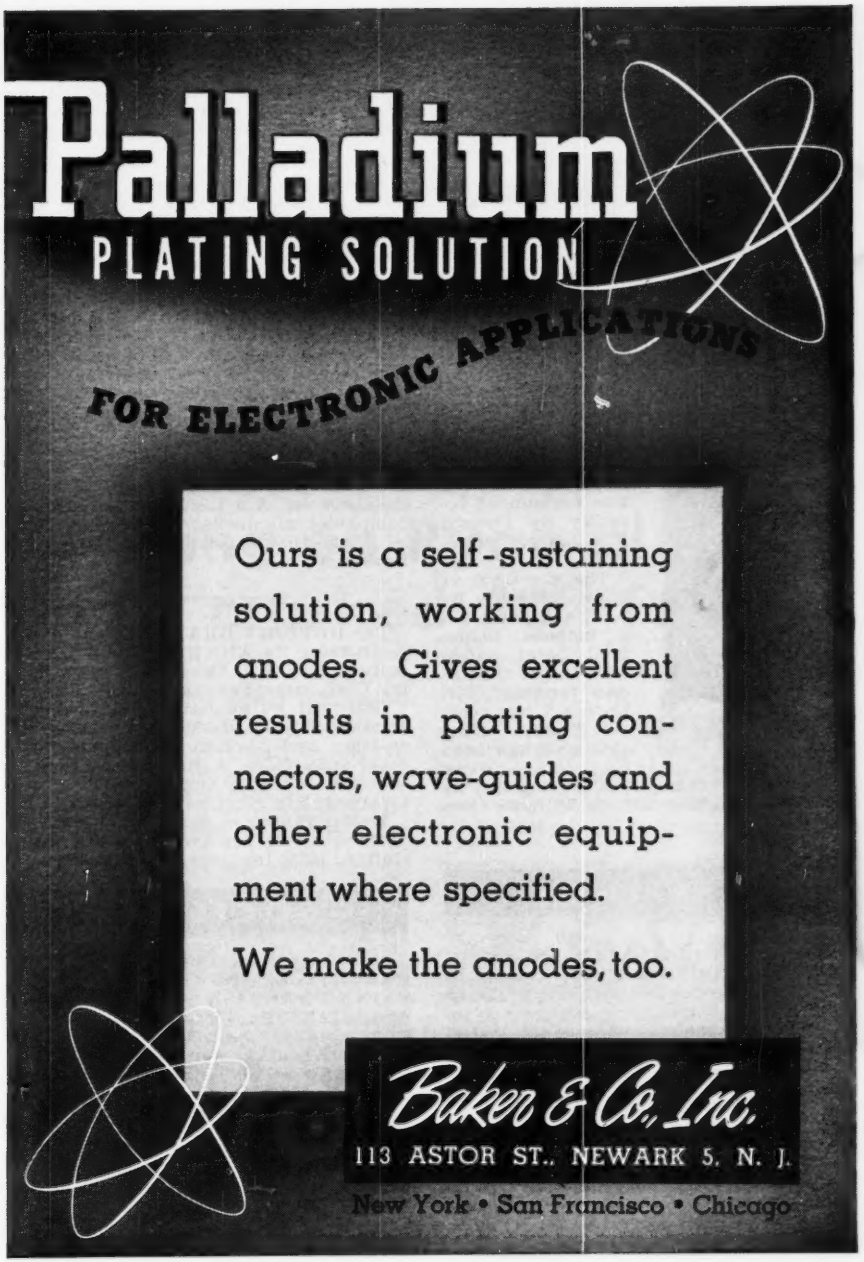
Classes have been given at Buffalo, New York; Richmond, Virginia; Atlanta, Georgia; and Troy, New York. Arrangements have also been completed for a class to be conducted at the Hotel Knickerbocker, Chicago, on June 29 and 30; New Hotel Jefferson, St. Louis, Missouri, on July 10 and 11, and New Orleans about the middle of July. After the New Orleans school, plans include visits to Dallas, Texas, Los Angeles and San Francisco, California.

HONORS

The Industrial Finishes Steering Committee, Advisory Board and Lacquer Committee of the National Paint, Varnish and Lacquer Association, held a testimonial dinner April 20 honoring **JOSEPH R. ESPOSITO** and **HENRY E. LACKEY** for their long and distinguished service to the industry. Each was presented with a silver tray, fittingly inscribed and containing the facsimile signatures of their numerous friends and well-wishers in the industry.

The dinner, which was held in the Greenbrier Hotel at White Sulphur Springs, was attended by many past and present members of these committees. Joseph A. Hager, chairman of the Steering Committee, was toastmaster.

Handy and Harman, New York N. Y., refiner and fabricator of precious metals, honored its president, **G. H. NIEMEYER**, at a dinner commemorating his 50th anniversary with the company.


Palladium
PLATING SOLUTION
FOR ELECTRONIC APPLICATIONS
Ours is a self-sustaining solution, working from anodes. Gives excellent results in plating connectors, wave-guides and other electronic equipment where specified.
We make the anodes, too.
Baker & Co., Inc.
113 ASTOR ST., NEWARK 5, N. J.
New York • San Francisco • Chicago

J. C. Travis, vice president of Handy and Harman, presented Mr. Niemeyer with a handwrought gold cigar box, lined in mother of pearl with a portrait medallion of his head on the cover. Accompanying the box was a leather bound book signed by the officers, directors and employees of the company.

Mr. Niemeyer joined the company as an office boy on May 1, 1900, and became Handy and Harman's first salesman in 1902, traveling for the firm until 1915 when he was appointed manager of the New York plant, then sales manager, and later vice president in charge of sales. In 1938 he became president.

S. C. Cathcart

An award for outstanding sales achievement in the Paint & Varnish Division of the Glidden Company was announced recently by Dwight P. Joyce, president.

The award of $1000 was won by **S. C. CATHCART,** a veteran industrial paint salesman in the Cincinnati territory. Mr. Cathcart has served Glidden since 1933 and has been an outstanding salesman for many years. During 1949 he increased his sales volume by more than $100,000.

MEETINGS

The **ST. LOUIS PAINT AND VARNISH PRODUCTION CLUB** is sponsoring a joint meeting of the C.D.I.C., Louisville, Kansas City, Chicago Clubs and individual Memphis members of the Federation, to be held in St. Louis at the Melbourne Hotel on Saturday, June 10.

Activities will include a plant tour of the Titanium Pigment Corporation on Saturday morning, and a symposium on mixing and grinding problems on Saturday afternoon. Dinner is scheduled for 6:30, and the St. Louis group has arranged a pleasant evening at the St. Louis Municipal Opera, presenting its first opera of the season "Brigadoon."

Symposiums on gas turbine materials, effect of sigma phase on high temperature metal properties, non-destructive testing in production, testing soils under triaxial loading, identifying and classifying of soils, and sessions on spectroscopy, cement and concrete, building materials and other metals and non-metallic materials, will feature the **FIFTY-THIRD ANNUAL MEETING OF THE AMERICAN SOCIETY FOR TESTING MATERIALS** at Chalfonte-Haddon Hall, Atlantic City, June 26 to 30, inclusive.

Much new testing and scientific equipment will feature the **NINTH EXHIBIT OF TESTING APPARATUS AND RELATED EQUIPMENT.** Leading manufacturers and distributors of instruments and laboratory supplies will emphasize the continued progress being made in providing the research and testing engineers with suitable facilities for evaluating the properties of all kinds of materials.

Adjoining the apparatus exhibit will be the photographic competition in which members of A.S.T.M. and of member companies will display photographs related to the theme: Materials, Testing and Research.

The **DETROIT BRANCH** of the **A.E.S.** is planning its **ANNUAL STAG DAY** to be held July 29 at the Forest Lake Country Club, near Pontiac, Michigan.

Golf will be available for those who wish to play; also soft ball games, bait casting, and horseshoes, together with other attractions. A dinner is planned for the evening and door prizes will be awarded.

Walter Pinner is chairman of the committee; tickets are available from Frank Clifton, 16536 Inverness, Detroit 21.

SOCIETIES

At a recent meeting of the **JUNIOR EXECUTIVES' GROUP, NEW YORK PAINT, VARNISH AND LACQUER ASSOCIATION,** the following officers were elected: chairman, Leonard Marshall, Devoe & Raynolds Co., Inc.; vice chairman, Irving Sapperstein, Gypsy Paint & Varnish Co.; and secretary-treasurer, Sherwood Munson, Breinig Brothers.

The following directors were elected: Bertram F. Ames, Maas & Waldstein Co.; Nelson Arnold, Keystone Varnish Co.; Howard Berman, Breinig Brothers; and Paul Eckhoff, Brooklyn Varnish Company.

Plating on Ryan planes now masked 50% faster

Ryan "Navion" landing gear struts, and many other precision parts, are now masked for plating with "SCOTCH" Pressure-Sensitive Tape No. 470. This plastic tape withstands hot or cold acids, caustics, most cleaners. Masking time is cut 50% with fewer rejects.

Whatever *your* plating problem, plastic-backed "SCOTCH" Pressure-Sensitive Tape is ready to save you time and money. Write Dept. PF-65 for complete information. No obligation, of course.

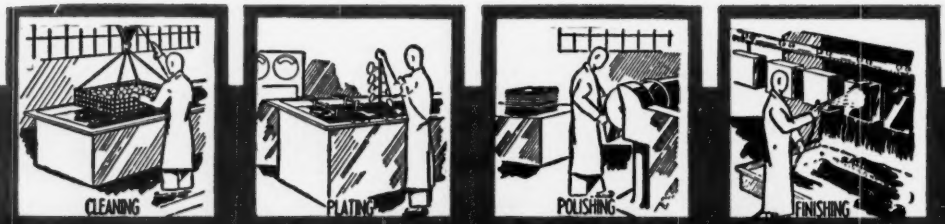
FACTS ON No. 470

- **FAST**—on at a touch, off cleanly.
- **STRETCHY**—conforms snugly to uneven surfaces.
- **TOUGH**—plastic backing withstands acids, caustics, most cleaners.
- **STRONG ADHESIVE**—allows no solution "creep-under."

SCOTCH BRAND
Pressure-Sensitive
Tape No. 470

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of other "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-walk" Non-Slip Surfacing, "3M" Adhesives, "3M" Abrasives.

General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.*
In Canada: CANADIAN DUREX ABRASIVES LTD., *Brantford, Ontario*



New • EQUIPMENT • MATERIALS • PROCESSES

One-Coat Enamel for Odd-Shaped Metal Items

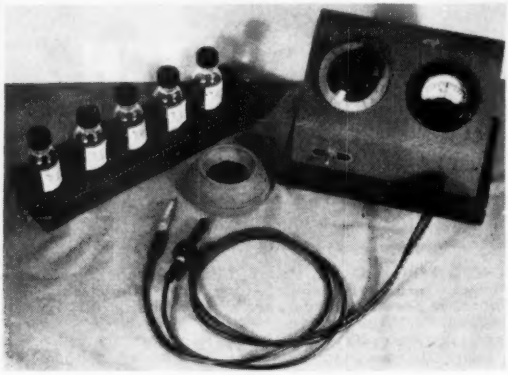
A one-coat synthetic enamel for conveyor dip application on odd-shaped metal items has been developed by the United Lacquer Mfg. Corp., 1001 W. Elizbeth Ave., Linden, N. J. Designated as Base 38862, it breaks at vital points and adheres well to various types of metals. Because of these properties, this synthetic enamel evenly covers all surfaces of odd-shaped items in a single dip operation, according to the company.

Base 38862 flows well on carpet sweeper bodies, odd-shaped metal containers and other similar objects. It may be baked in gas ovens or under infra-red lights. It is available in all colors, in a gloss, satin, or dull finish.

"Electrospot" for Metal and Alloy Identification

A portable metal and alloy identification instrument known as Electrospot has been developed by Electrochemical Instrument Laboratory, 532 Woodland Ave., Mountainside, N. J. The instrument weighs less than five pounds, measures 9 x 5 x 6 inches and requires no external source of power for operation. Electrospot makes use of the inherent differences in the surface films ever present on metals and alloys to effect separation by electrolytic means. Identification of small items is accomplished by dipping a portion of the material in an electrolyte and for large items by pressing a test probe against the material. Reading a dial setting after rotation in a "zero" deflection on a millivolt meter identifies the alloy. For rapid sorting, a predetermined dial setting is used. An immediate deflection of the meter pointer to the right or left identifies the material.

Electrospot may be used to identify and sort materials regardless of shape or form. Identification tests with this instrument are rapid and non-destructive, it is claimed. A testing rate as high as 1,000 pieces per hour under production conditions is possible. As identification is based solely on chemi-



"Electrospot" for Metal and Alloy Identification

cal composition, previous heat treating history of the alloys can be ignored. Electrospot is ideally suited for rapid control identification of spool wire in the screen manufacturing industry and for electroplate in the electroplating industry. It may be used for identification checks on raw and fabricated materials prior to further processing on final installation and for the sorting of scrap metals. It has been applied to the sorting of alloys of aluminum, copper, steel, gold, iron, lead, nickel and stainless steels.

Hill Oscillating Roll-Type Sheet Buffing Machine

The Hill Acme Co., Cleveland, Ohio, has developed a 48-inch wide Hill Openside Oscillating Type Sheet Buffing Machine, with hydraulic table and power elevating and lowering head for 18-inch diameter buff roll or Tampico brush roll. It is recommended for heavy duty production finishing of ferrous and non-ferrous sheets.

The oscillating mechanism is powered by a 2 h.p. motor and has a stroke variation from ½ to 2 inches, and a range of 50 to 150 cycles per minute. The main spindle is powered by a 50 to 100 h.p. main drive motor. The machine is built in table widths up to 72 inches and table lengths of 8 feet and over.

"Tecosteel"

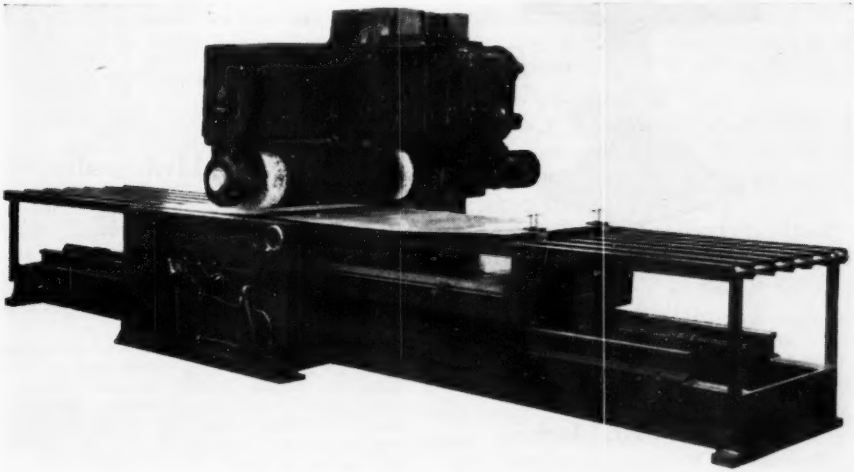
Formulated to protect metals subject to temperatures ranging from 500 to 1200 deg. F., an aluminum paint that can be applied like ordinary paint and requires no primer has been developed by Thompson & Co., Oakmont, Pa. Panels painted with this paint have stood repeated quenchings in water after being heated up to 1250 deg. F., with no impairment of the film, it is stated.

The paint, called "Tecosteel", air dries in 12 to 18 hours and can be baked dry at 350 deg. F. in 15 minutes. It can be brushed, sprayed or dipped. According to the manufacturer, it has good salt spray and humidity resistance.

Because of its durability under extreme heat, it is recommended for annealing boxes and furnaces, industrial ovens, hot smoke stacks, hot air ducts and superheated steam lines. The manufacturer also recommends it for economizer tubes, power plant boilers, boiler and furnace doors, digesters, and manifolds.

Vonnegut Universally Adjustable Spindle Stand

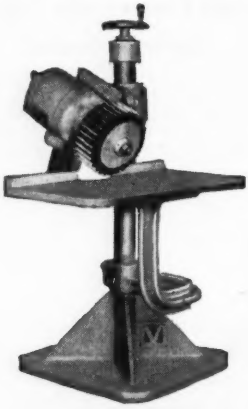
The Vonnegut Moulder Corp., 1810 Madison Ave., Indianapolis, Ind., has announced development of a spindle stand which is "universally adjustable." Designed for finishing and polishing work



Hill Oscillating Roll-Type Sheet Buffing Machine

which is to be pushed across a table by hand or by power feed, the stand's motor can be turned to point the spindle straight up, straight down, and through all of the 180 degrees between these extremes. It has 20 inches of vertical adjustment and also 5-inch adjustment lengthwise of the spindle. With this three-way combination of adjustments, the company points out, a head can be brought into proper relation with any surface of any pattern when the spindle stand is located next to a feed bed or table on which the work pieces are being advanced. In addition to the three adjustments mentioned above, the motor and its support may be rotated around the vertical column. On narrow patterns or edgework the full 4-inch width of abrasive can be used by resetting the head with the 5-inch longitudinal adjustment.

The laminated wood table adds to the versatility of the machine. Guide pegs or an additional fence, to channel the stock between two fences, are easily attached and removed. When used with power feeding mechanism, the standard table and its supporting arm are omitted, allowing free rotation of the motor and its support about the vertical column. Flexible arrangement of multiple stands is thus permitted.



Vonnegut Universally Adjustable Spindle Stand

Flexible Shaft Machine

Product of Wyzenbeek & Staff, Inc., 822 W. Hubbard St., Chicago 22, Ill., the Wyco Lo-Gravity Flexible Shaft Machine is now available in a modernized and redesigned model with a fully enclosed drive.

Wyco Lo-Gravity Flexible Shaft Machine

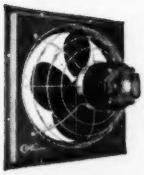
Made from steel stampings and joined by welding, the machine is said to be light in weight and exceptionally strong. The location of the motor on the tripod base of the machine provides excellent stability.

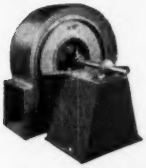
The base of the machine is constructed so that any motor of suitable horsepower will fit. The use of a three or four-step V pulley has increased the range of the application of the equipment by reason of the ease with which different speeds can be selected. Added features include an accentric belt adjustment on the jack shaft and a locking clamp located on top of the machine for holding the handpiece when the machine must be used for stationary grinding.

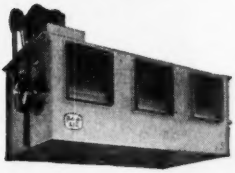
Improved Hydroscale

An impact-resistant, special tempered dial glass that can take severe blows without breaking and so eliminate the need for protective metal guards, is now being used in Hydroscales, hydraulic crane scales, manufactured by Hydroway Scale, Inc., 20624 W. Eight Mile Rd., Detroit 19, Michigan.

The glass is up to five times as strong as plate glass of equal thickness yet will bend as much as 20 degrees without breaking. It will also absorb a thermal shock of 500 degrees without breaking or distorting, making it practical to use the scales in heat treat and other areas where extreme temperature conditions exist.







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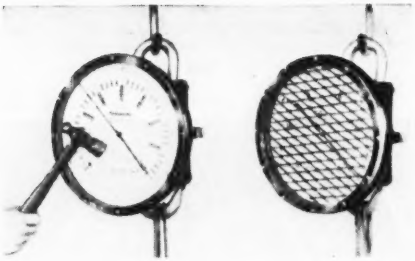


Illustration shows demonstration of how impact-resistant glass eliminates need for metal guard on Hydroscale.

The core of the Hydroscale dial glass is relatively soft and exterior surfaces extremely hard. It can be polished and wiped indefinitely without scratching.

Surface Active Agents Become "Surfactants"

To put an end to the wide-spread and growing confusion between synthetic detergents and other related surface-active agents, a new word, "Surfactants", has been coined by Antara Products, General Aniline & Film Corp., 444 Madison Ave., New York 17, N. Y., and was presented to the chemical industry to cover all materials that have surface activity, including wetting agents, dispersants, emulsifiers, detergents, and foaming agents. The new term is not copyrighted or trade marked. It gives a distinctive name to one of the fastest growing branches of the chemical industry, with an annual production of 800 million pounds.

Surfactants are the unique chemicals which concentrate in liquid surfaces and interfaces. They lower surface tension and tend to increase the surface area. Some act as wetting agents by spreading quickly over solid surfaces and into pores; others cut into deposits of grease or solid particles and disperse them to facilitate cleaning. Dispersants also keep fine powders suspended in lotions and liquids. They are used in insecticides, weed killers, and agricultural sprays.

Other surfactants emulsify oils with water in cosmetics, creams and greases. Some generate lavish foams and suds in shampoos, while others suppress the suds in washing compounds used in automatic washing machines.

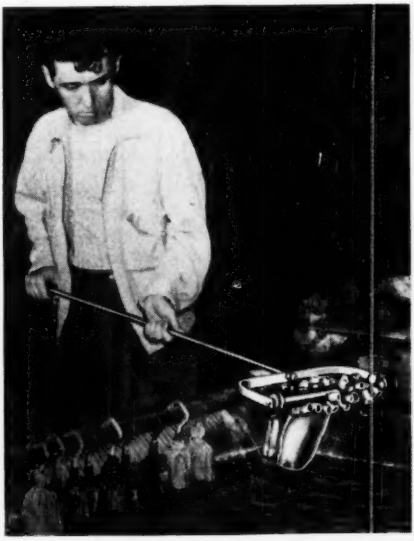
Synthetic detergents may possess many of these properties, but true detergents account for only about 150 of the 750 brand name surfactants now on the market. For lack of a general name, wetting agents and emulsifiers have been incorrectly called detergents. The word, detergent, returns to its original and correct meaning, a cleansing agent.

Eriez Tank Magnet

For removing ferrous parts and contamination from electroplating tanks, alkali baths, acid baths, and so on, Eriez Mfg. Co., Erie, Pa., is offering a permanent magnetic device.

Made of stainless steel, the tank magnet is temperature-proof, acid and alkali-proof. It is operated like a carpet sweeper, with the magnetic tube mounted between Neoprene wheels. Ferrous material moves to the magnet and spreads itself over the entire circumference to a thickness of about ¾ inch. Unloading is accomplished at either end by simply pushing the upper ring from one end of the tube to the other, where a non-magnetic section causes the load to be released.

The unit is light and easy to handle. It collects parts and will not attach itself to the tank. It is 48 inches overall; 16¼ or 21⅛ inches wide.



Eriez Tank Magnet in use

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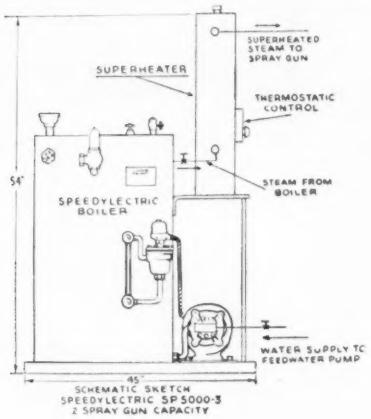
Vedoc

Speedylectric SP500 Steam Spray Painting Boiler

Pioneering in the field of spray painting using steam instead of compressed air, the Livingstone Engineering Co., 100 Grove St., Worcester 5, Mass., has announced its Speedylectric SP500, an all-electric steam power plant complete with built-in 100 p.s.i. boiler, ASME Code, National Board inspected and stamped,



Speedylectric SP500 Steam Spray Painting Boiler

Underwriters' Laboratories listed.

The SP500 includes an electric superheater with thermostatic control and boiler feed pump, motor, and controls. The boiler is self-regulating, maintaining electric input in exact balance with steam output, an exclusive feature of all Speedylectric boilers with automatic balanced control.

The unit is available in a range of capacities from 1 to 10 spray guns or larger, and operates on 220, 440, 550 volts a.c., single or poly-phase. Advantages claimed by the manufacturer include its freedom from flame or fire hazards and from all low water danger.

Synthetic Lacquer

Development of a synthetic lacquer that permits beautiful and intricate designs to be screen printed on vinyl without puckering the plastic's surface has been announced by The Monroe Sander Corp., 10-18 46th Ave., Long Island City 1, N. Y., manufacturer of industrial finishes.

The product, available in a wide variety of colors, can be used by manufacturers of vinyl plastic curtains, draperies, tablecloths and other similar household items; vinyl inflated toys; crib sheets and other babies' items; advertising displays; and novelties made of vinyl. From eight to ten colors, of a brightness and intensity previously unachieved, can be applied to the plastic, the manufacturer claims.

PRODUCT LITERATURE

The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning PRODUCTS FINISHING when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

"pH—Its Measurement and Industrial Importance" is the title of a 12-page bulletin issued by the Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa. Advantages of pH control to industry, typical applications of pH meters, and measurement of pH are some of the topics covered, together with illustrations and descriptions of the various meters and accessories.

Oakite Service Report. How to combat rust throughout the production process in metal working plants is the subject of a special Service Report published by Oakite Products, Inc., 120 Thames St., New York 6, N. Y. This report offers a concise description of specialized materials and procedures that remove rust from raw stock, clean and de-rust in one operation, prevent rust while parts are being processed, and prepare metal for paint while affording protection against rust before and after painting. Also reported upon are materials, for use by machine or tank methods, that remove buffing compounds, drawing and stamping compounds, cutting and grinding lubricants, mill and slushing oils, solid-particle dirts and smuts from metal parts, and at the same time provide efficient temporary protection against rust.

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FOR TUMBLING

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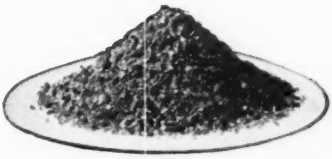

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Anaconda Copper Anodes. The American Brass Co., Waterbury 88, Conn., has available **Publication C-5** describing its Anaconda Sheet, Oval, and Electrodeposited Copper Anodes. Graphic illustrations are included, together with specifications.

Monarch Nickel Anode Bags. William Parker, P. O. Box 209, Worchester 1, Mass., has issued a pocket-size folder listing specifications of his cotton and nylon nickel anode bags and a sheet setting forth tests for the suitability of such bags.

Phosphate Coating Chemicals Selection Chart. A comprehensive phosphate coating chemicals selection chart is being distributed by the American Chemical Paint Co., Ambler, Pa. The chart lists in convenient form information about the various products and processes marketed by the company and discusses each product from the standpoints of metal surfaces treated, type of coating, method of application, scale of production, typical products treated, chemicals required, precleaning methods, phosphating bath conditions, object of coating, coating weight range, after-treatment, testing methods, and government specifications. Under the heading "Product and Process" not only the various products themselves are listed but also the method of applying the process, such as by spray, dip, or brush. Reference is made to the proper technical service data sheet for more complete information about product or process.

The chart is prepared in a convenient form for insertion into the standard 8½ x 11 ring binder so that it can be made a part of a reference data book and thus be kept available for reference.

Make-Up Air Units to replace exhausted air and balance minus pressures, products of The New York Blower Co., 3166 S. Shields Ave., Chicago 16, Ill., are the subject of **Bulletin 453.** Characteristics, specifications, and features of the units are illustrated and described.

Nukemizing, a method of corrosion-proofing plating, pickling, chemical process, and storage tanks, its features and advantages, are summarized in a bulletin released by Nukem Products Corp., Buffalo 20, N. Y. Recommended applications and general information on Nukemizing are also given.

Krouse Magnifying Micrometer, a precision pocket tool for measuring the thickness of plating, paint, and enamels, is fully discussed and illustrated in **Bulletin 49-M,** published by the Krouse Testing Machine Co., 573 E. 11th Ave., Columbus 3, Ohio.

Metal Cleaning. A profusely illustrated catalog of metal cleaning and finishing machinery is available from the Cincinnati Cleaning and Finishing Machinery Co., Schmidt Bldg., Cincinnati 2, Ohio. Data in the 24-page catalog include a brief discussion of metal cleaning principles plus photos and descriptions of more than a score of widely varying machine types. Many of the photos show "installed-in-operation" views, together with diagrammatic details. A number of operational features, common to machinery designed and built by the manufacturer, are shown and described.

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Opportunity Section

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Situation open—Sales engineer thoroughly experienced in the polishing and buffing field. Must have sales ability and experience in buff research and development. Should be capable of polishing and buffing shop demonstration. Write fully giving education and experience details. Reply Box No. 66, c/o Products Finishing, 431 Main St., Cincinnati 2, Ohio.

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FOR SALE: 13,000 gal. — enamels, primers and lacquers. 50c per gallon in 200 gallon lots. Variety of colors. All well-known manufacturers. 5 and 55-gal. drums.

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Will BUY your dirty THINNERS and SOLVENTS. Send sample or letter giving approximate contents and solids. The Johann Company, 633 East 138th Street, Dolton, Illinois.

Salesman for lacquers and enamels by national manufacturer for Philadelphia territory. Write Box No. 67, c/o Products Finishing, 431 Main Street, Cincinnati 2, Ohio.

DEGREASERS

(1) Blakeslee TE Model Vapor Spray Degreaser, Crossrod type conveyor, Steam, takes size 24"x10"x8" work. Moves 1500 lbs. per hr. Complete, New.
(1) Blakeslee TH Model Liquid Spray Degreaser, Crossrod type conveyor 1200 lbs. per hr. cap. Used.
(1) Detrex Model-1-DC-700-Solvent Machine Mesh conveyor type 11x17x1½ clearance, Steam. Complete, Used.
(1) Detrex unit, Vapor Solvent type, Cleaning compartment 24x48x48 deep. Complete, Used.

These units can be purchased at fraction of their original costs. For further information or blue prints, contact:

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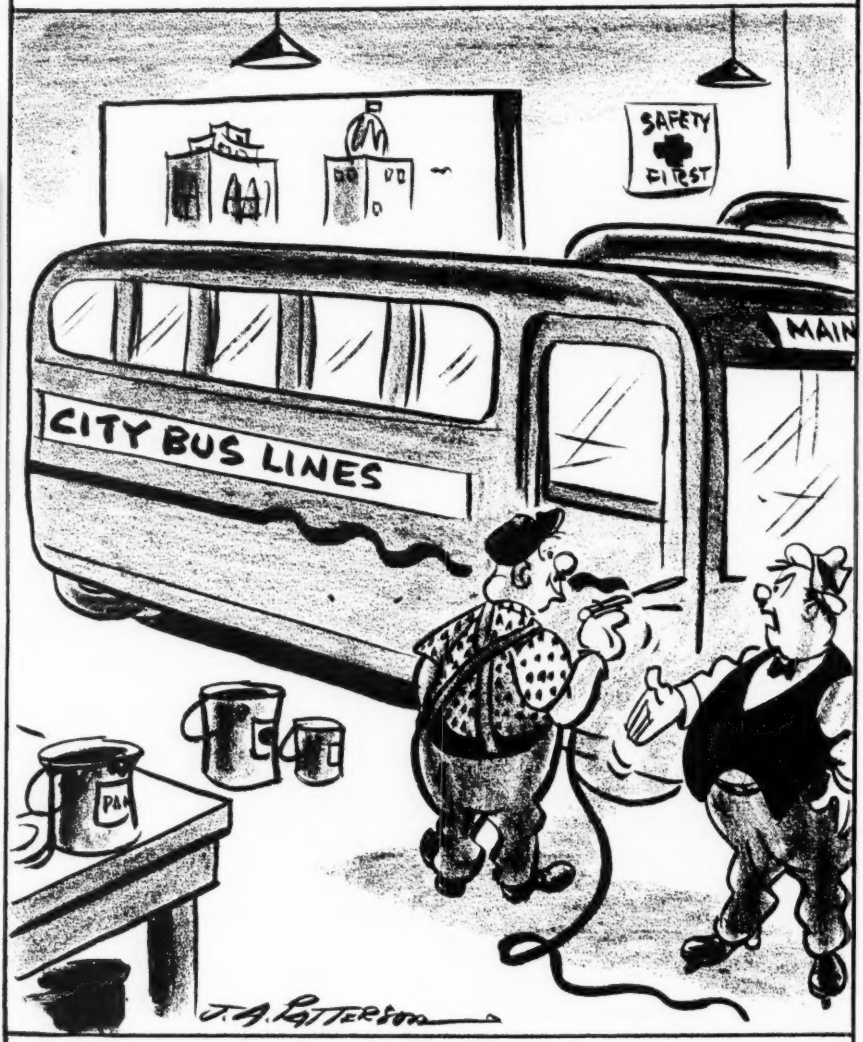
Nu-Kast No. 166 Pump. Nukem Products Corp., Buffalo 20, N. Y., has prepared a two-color, four-page bulletin on its Nu-Kast No. 166 Pump, a compact assembly for handling plating or pickling solutions in plating plants, steel and wire mills, and in chemical plants. Features and recommended usage are discussed and miscellaneous data provided.

Duclone Collectors for industrial dust control and recovery are the subject of **Catalog No. DC-49** prepared by The Ducon Co., 147 E. Second St., Mineola, N. Y. The 12-page catalog describes constructional and operating features, and is illustrated with efficiency curves and schematic drawings and photographs of different industrial applications.

The Finishing Touch — **By J. A. Patterson**



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(Enough to treat 240 gal. zinc solution.)

THROWS DOWN HEAVY METAL IMPURITIES.

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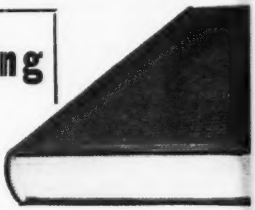

HERE are the basic theories and principles of electroplating—the practical methods and processes that are of invaluable use to everyone concerned with electroplating and electrotyping. The most efficient methods of making electrodeposits on more than 40 different metals, alloys, and plastics are summarized completely in this thoroughly revised and enlarged book.

Principles of
ELECTROPLATING & ELECTROFORMING

By William Blum, Chemist, U. S. Bureau of Standards and George B. Hogaboom, Consultant

Revised 3rd Edition
455 pages, 6 x 9
24 tables, illus.
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Completely revised to make it a more practical working guide, this book summarizes and digests the best of modern practice in the field. It covers qualitative, quantitative analyses of solutions; pickling, dipping; electropolishing; electroforming, electrotyping; producing phonograph record matrices, and manufacturing tubes, etc. Metals are dealt with in the same order as in the periodic system of elements.

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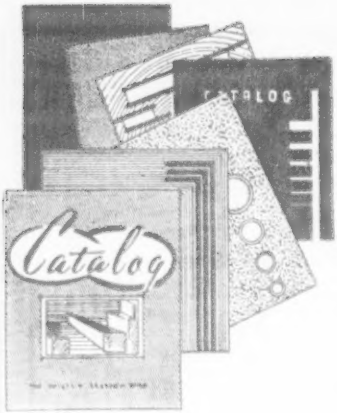

Catalogs

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Finishing Equipment
"Mahon Industrial Equipment," including Complete Finishing Systems for Enamel; Lacquer; Paint and Varnish; Spray Pickling Equipment; Metal Cleaning and Rust Proofing Equipment; Dry-off Ovens; Filtered Air Supply Systems; Hydro-Filter Spray Booths; Drying and Baking Ovens; Core Ovens; Dust Collecting Systems, is described in a booklet available from R. C. Mahon Company, Detroit 11, Michigan.

2. Solvent Degreasing
A 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants has been published by the Detrex Corp., Detroit 32, Michigan.

3. Synthetic Resins
The Hercules Powder Co., Wilmington, Del., has available a 20-page technical booklet which describes the properties and lists the uses of the synthetic resins manufactured by the company.

4. Industrial Enamels
"Pittsburgh Standard Industrial Enamels" is the title of a color card issued by the Pittsburgh Plate Glass Co., Industrial Paint Div., Pittsburgh 22, Pa. The card contains color samples and recommendations for surface preparation and finish application.

5. Electroplating Tape
Physical and chemical properties of "Scotch" electroplating tape, general functions in electroplating, insulation protection, and application procedure for plating racks are contained in a data sheet published by the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn.

6. Tank Heater
"Platecoil," a lightweight embossed plate for tank heating, is discussed as to installation, operation, features, and advantages in Bulletin P-50 released by the Kold-Hold Manufacturing Co., Lansing, Michigan.

7. Buffing and Polishing Compounds
A four-page pocket-size guide for purchasers of polishing and buffing compounds is available from the Mosher Co., Chicopee, Massachusetts.

8. Industrial Washing Machines
Factors to be considered in making a proper choice of equipment for thoroughly cleaning metal products are described in a 28-page book published by The Alvey-Ferguson Co., Cincinnati 9, Ohio.

9. Heat Exchangers
Complete details on Durco Heat Exchangers for plating applications are contained in Bulletin 1603A available from The Duriron Co., Dayton 1, Ohio.

10. Metal Cleaning Guide
Oakite Products, Inc., New York, N. Y., has prepared a 44-page booklet which reviews metal cleaning in all its phases. Discussed are specific materials, equipment, and procedures for removal of fabricating operation soils, together with other information.

11. Buffs
A folder describing in detail the advantages of Jackson Airway Ventilated Buffs is available from the Jackson Buff Corp., Long Island City 1, New York.

12. Dust Control Systems
Young & Bertke Co., Cincinnati, Ohio, has prepared a booklet picturing and describing its method of solving the dust problems created in various industrial plants.

13. Black Finish
Data sheets describing the Controlled Oxidation Pentrate process for black oxide finishing of steel can be obtained from the Heatbath Corp., Springfield 1, Masschusetts.

14. Bright Nickel Plating
Udylite Bright Nickel Plating Process and its advantages are the subject of Bulletin 51, distributed by The Udylite Corp., Detroit 11, Michigan.

15. Synthetic Finish

"Dimenso," a synthetic finish that is designed to provide two colors in one spray operation, is described in a booklet now available from The Sherwin-Williams Co., Cleveland 1, Ohio.

16. Paint Bonding Chemicals

A quick reference list of metal protective and paint bonding chemicals and processes can be obtained from the American Chemical Paint Co., Ambler, Pennsylvania.

17. Infra-Red Ovens

How to step up efficiency in drying, baking, preheating, and dehydrating operations with the use of Jensen New Principle "Dual Heat" Infra-Red Ovens is the topic of a four-page catalog released by Jensen Specialities, Inc., Detroit, Michigan.

18. Spray Booths

Catalog 480 describing the Schmieg Centri-Merge Spray Booths for the elimination of paint overspray, with photographs and blueprint reproduction of typical plant installations, can be obtained from Schmieg Industries, Inc., Detroit, Michigan.

19. Metal Surface Preparation

The Parker Rust Proof Co., Detroit 11, Mich., has issued a catalog describing the Bonderizing process, as applied to steel, aluminum, zinc, die castings, and alloys, designed to preserve fine finishes by anchoring the applied paint film and retarding corrosion.

20. Corrosion Resistant Coating

A descriptive folder containing specifications and application data on "Rust-Chek", a corrosion resistant product undercoat, is available from the Rinshed-Mason Co., Detroit 10, Michigan.

21. Industrial Ovens

The Kirk & Blum Manufacturing Co., Cincinnati 25, Ohio, has published a descriptive catalog showing installation views of its wide variety of industrial ovens in various types of plants.

22. Silicone-Base Finish

Properties of Mico silicone-base aluminum finish and product applications for the finish are outlined in a folder issued by Midland Industrial Finishes Co., Waukegan, Illinois.

23. Troxide Bulletin

Troxide, dry acid salt compound for pickling prior to porcelain enameling, is described in a technical bulletin issued by MacDermid, Inc., Waterbury, Connecticut.

24. Clear Lacquer

The Randolph Products Co., Carlstadt, N. J., has issued a folder which contains helpful, technical, and factual information on clear lacquer.

25. Air Compressors

Bulletin CK-101 providing full details on its 7½, 10, and 15 h.p., 4-cylinder "V" type air compressors can be obtained from The DeVilbiss Co., Toledo, Ohio.

26. Liquid Processing Equipment

Filters, mixers, pumps, tanks, and other standard units developed to meet the varying demands of customers are shown and described in a 24-page catalog prepared by the Alsop Engineering Co., Milldale, Connecticut.

27. Polishing and Buffing Equipment

Frederic B. Stevens, Inc., Detroit 16, Mich., has issued Catalog No. 27 which describes and illustrates materials and methods for polishing, buffing, and descaling operations, together with helpful production hints.

28. Solvent Vapor Degreasers

Blakeslee Solvent Vapor Degreasers, their operating characteristics, features, and advantages, are explained and illustrated in full detail in a 20-page booklet available from G. S. Blakeslee & Co., Chicago, Illinois.

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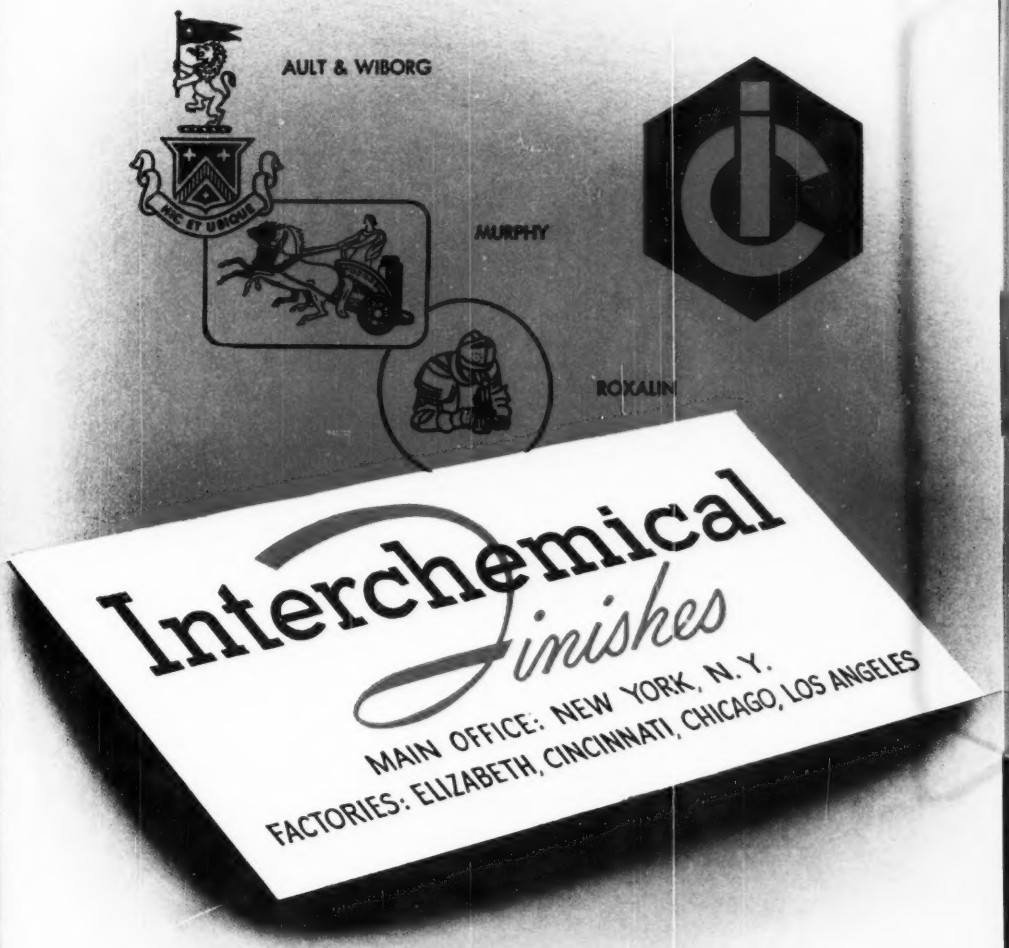

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